Colorado River Basin Salinity Control Program
Federal Accomplishments Report for Fiscal Year 2013

Presented to

Colorado River Basin Salinity Control
Advisory Council

by

United States Department of Agriculture
Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey
Bureau of Land Management
Bureau of Reclamation

October 2013

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Acronyms and Abbreviations

Advisory Council	Colorado River Basin Salinity Control Advisory Council
ASCS	Agricultural Stabilization and Conservation Service
Basinwide Program	Basinwide Salinity Control Program
BLM	Bureau of Land Management
BSP	Basin States Program
CAP	Central Arizona Project
CRBSCP	Colorado River Basin Salinity Control Program
CRSS	Colorado River Simulation System
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
FAIRA	Federal Agricultural Improvement and Reform Act
FOA	Funding Opportunity Announcement
Forum	Colorado River Basin Salinity Control Forum
FSRIA	Farm Security and Rural Investment Act
FY	Fiscal Year
GGNCA	Gunnison Gorge National Conservation Area
GIS	Geographic Information System
HDB	Hydrologic Date Base
NCA	National Conservation Area
NIWQP	National Irrigation Water Quality Program
NRCS	Natural Resources Conservation Service
Reclamation	Bureau of Reclamation
RMP	Resource Management Plan
Service	U.S. Fish and Wildlife Service
TDS	Total Dissolved Solids
TMS	Technical Modeling Subcommittee
USDA	United States Department of Agriculture
USGS	U.S. Geological Survey
UVWUA	Uncompahgre Valley Water Users Association
Work Group	Colorado River Basin Salinity Control Forum's Work Group

Table of Contents

List of Tables

List of Figures

U.S. Department of Agriculture (USDA)
Natural Resources Conservation Service (NRCS)

Colorado River Basin Salinity Control Program
Accomplishments for Fiscal Year 2013

The NRCS of the USDA conducts Colorado River Basin Salinity Control activities primarily under the authorities of the Environmental Quality Incentives Program (EQIP). EQIP was enacted with passage of PL104-127, Federal Agricultural Improvement Act of 1996, a.k.a. "1996 Farm Bill."

EQIP has been reauthorized twice; by PL 107-171, The Farm Security and Rural Investment Act of 2002, the "2002 Farm Bill" and by PL 110-246, The Food, Conservation, and Energy Act of 2008, the "2008 Farm Bill." The 2008 Farm Bill expired September 30, 2012; however certain programs of the 2008 Farm Bill, including EQIP, were extended through fiscal year (FY) 2014 via a continuing resolution in late 2012.

Through EQIP, NRCS offers voluntary technical and financial assistance to agricultural producers, including Native American tribes, to reduce salt mobilization and transport to the Colorado River and its tributaries. Within the twelve salinity project areas, producers may be offered additional financial incentives and technical assistance to implement salinity control measures with the primary goal of reducing offsite and downstream damages and to replace wildlife habit impacted as a result of the salinity measures.

In FY 2013, $10.2 million of appropriated EQIP funding was obligated into new land treatment contracts with agricultural producers in project areas in Colorado, Utah, and Wyoming. These contracts, when fully implemented will provide about 10,500 tons of annual salt control.

New Projects, Activities and Investigations

Henrys Fork (of the Green River), Wyoming

The Henrys Fork Project was officially adopted with the issuance of the Record of Decision, June, 2013. Several applications for financial assistance from the EQIP have been received and will be prioritized for FY 2014 funding.

West Blacks Fork (of the Green River), Wyoming

An area of some 28,000 acres of irrigated pasture and hayland near Lyman, Wyoming, contribute salt to the Blacks Fork River, tributary to the Green River. While a large portion of the geology contributes little salt, about 10,000 acres may contribute significant amounts of salt from canal and ditch seepage and deep percolation from water applied to fields.

The Wyoming Water Development Commission provided a significant grant to the Austin-Wall Canal Company resulting in a comprehensive plan to modernize the irrigated areas within their service area. NRCS anticipates that, in the near future, the Company will begin replacing

earthen canals with buried pipelines that will provide pressure to operate sprinklers on the irrigated lands. NRCS intends to use its regular EQIP authority to assist producers in the area who want to modernize their irrigation systems. Such improved systems will provide significant salt control benefits.

San Juan Basin, New Mexico and Arizona

The first phase of the "Shiprock Pilot Project" to control salt was completed by the San Juan River Dineh Water Users, Inc. (SJRDWU, Inc.) in 2011. A leaky earthen lateral supplied water to 12 Navajo Nation farmers on 168 acres of cropland. The SJRDWU, Inc. completed the construction using their own resources and a grant from the Bureau of Reclamation. The SJRDWU, Inc. also reserved an eight acre parcel of land and has completed practices to replace wildlife habitat values that were lost due to the pipeline installation.

The NRCS has been actively promoting the use of EQIP to improve the on-farm irrigation systems served by the pipeline. EQIP applications have been received but, to date, no installation has occurred. As salt loading is quite high from agriculture along the San Juan River, it is hoped that this pilot project will encourage and accelerate salinity control. The SJRDWU, Inc. has expressed continuing interest in improving the irrigation delivery and application systems within their service area.

Areas Beyond Current Project Boundaries

In Colorado, about $1.3M of EQIP funds allocated for salinity control were obligated into 26 new contracts on 940 acres that will control about 1500 tons. The annualized cost per ton is $97.

Utah and Wyoming did not obligate any "salinity" EQIP funds outside of project areas.

Even though some relatively high salt loading basins exist in both Colorado and New Mexico, local sponsors have not yet been inclined to pursue a salinity project designation.

Monitoring and Evaluation

Project offices continue to monitor and evaluate the effectiveness and quantity of salinity control, wildlife habitat, and economic performance replacement in order to improve overall performance and management of the program. The program continues to function effectively and economically, though the nominal cost per ton of salt control continues to rise in some areas, however, when adjusted for inflation the current cost effectiveness compares favorably with the projected costs at the time of the adoption of the respective projects.

It is also noted that additional efforts are needed to identify and implement valuable, low-maintenance, sustainable wildlife habitat replacement. The individual Monitoring and Evaluation reports for FY 2012 for each project can be found on the World Wide Web at http://www.usbr.gov/uc/progact/salinity/index.html

Status of Planning and Implementation

USDA-NRCS is providing technical and financial assistance to landowners and operators to implement on-farm salinity control measures in eleven approved project areas in three Upper Basin states.

Table 1 - Active Salinity Control Projects

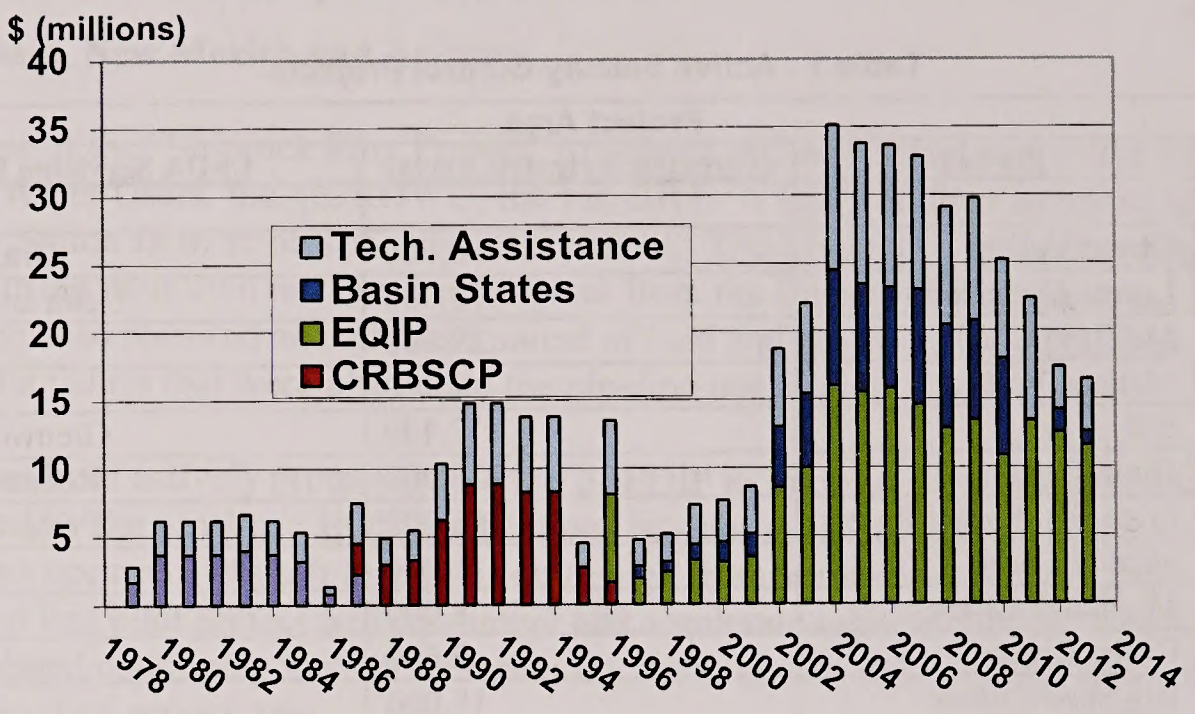
Project Area			
State	**Project**	**(Potential Irrigated Acres)**	**USDA Servicing Office**
Colorado	Grand Valley	50,000	Grand Junction
	Lower Gunnison River	171,000	Delta and Montrose
	McElmo Creek	29,000	Cortez
	Mancos Valley	11,700	Cortez
	Silt	7,400	Glenwood Springs
Utah	Uinta Basin	226,000	Roosevelt, Vernal
	Price/San Rafael Rivers	66,000	Price, Castle Dale
	Muddy Creek	6,000	Castle Dale
	Manila-Washam	8,000	Vernal
	Green River	2,600	Price
Wyoming	Big Sandy River Henrys Fork	18,000 20,700	Farson Lyman
	Total	**616,400**	

Program History

Progress in implementing the various projects is controlled primarily by annual appropriations, supplemented with funds from the Basin States Parallel Program. From the 1970s through 1986, the Agricultural Conservation Program (ACP) administered by the Agricultural Stabilization and Conservation Service (ASCS) provided financial assistance (cost share) to land users through long term agreements (LTAs) and the Soil Conservation Service (SCS) provided the technical assistance to plan, design and certify practice implementation. From 1987 through 1996, the Colorado River Basin Salinity Control Program (CRBSCP) received dedicated annual funding, again with the ASCS administering the financial assistance and SCS providing the technical assistance. In 1995, Public Law 103-354 authorized the reorganization of several agencies of USDA. The ASCS was reorganized as the Farm Service Agency. The SCS was reorganized as the NRCS. Financial administration of the CRBSCP was transferred to the new NRCS where it has remained to the present.

The Federal Agricultural Improvement and Reform Act (FAIRA) of 1996 (Public Law 104-127) combined four existing programs including the CRBSCP into the newly authorized EQIP. In FY 1997, Reclamation began on-farm cost sharing from the Basin States funds that would parallel and supplement the EQIP. For every $1 of USDA funds allocated to salinity control in the authorized project areas, approximately 43 cents is made available from Reclamation's Basin Funds account for additional financial and technical assistance.

Figure 1 - On Farm/Near Farm Allocations



In 2013, NRCS obligated and expended about $15.5M of appropriations to EQIP contracts with salinity control measures in Colorado, Utah, and Wyoming. This amount will enable the Basin States Program (BSP) to provide an additional $6.6M of cost share for additional salinity control measures, wildlife habitat replacement or research, investigations or studies.

Grand Valley, Colorado

Implementation has been underway in this unit since 1979 and NRCS considers that the salt control measures of the project have been successfully completed as planned. In 2010, a status report was compiled from field visits and observations. The report indicated that at least 12,000 irrigated acres are no longer in agricultural production. Of the remaining 44,700 acres still in production, 42,435 acres or 95 percent had received varying levels of treatment.

As of October 2013 the salt reduction goal of 132,000 tons had been exceeded and more than 147,500 tons had been reported as controlled. In 2013, 30 new contracts were obligated and when implemented will control554 tons of salt control.

While the Grand Valley project has been very successful in reaching its salt control goal, the wildlife replacement goal remains to be met. Approximately 400 acres of additional habitat replacement are required. Final contract development is underway for several parcels totaling about 600 acres that would achieve the replacement goal.

Lower Gunnison Basin, Colorado

This project encompasses the irrigated farmland in the Gunnison and Uncompahgre River valleys. With the expansion into the upper headwaters of the Uncompahgre River in 2010, implementation is now proceeding in Delta, Montrose, and Ouray Counties. Implementation was initiated in 1988 in this unit. Nearly 60 percent of the salt control goal has been achieved. Interest remains high in the project area with hopes that the findings of the Lower Gunnison Comprehensive Plan will increase applications. Nearly $3.2M was obligated into 49 new contracts with plans to control an additional 2,600 tons of salt on 1820 acres.

Mancos River, Colorado

This project, near the town of Mancos, Colorado, was initiated and approved for funding and implementation by USDA-NRCS in April 2004. Currently, 54 contracts have been developed with EQIP and Basin States Parallel funds. Four new contracts for $105,000 were developed in 2013 for 55 tons of new salt control.

McElmo Creek, Colorado

Implementation was initiated in this unit in 1990. Application of salinity reduction and wildlife habitat replacement practices continue to be implemented in this area with sprinkler systems, underground pipelines, and gated pipe being installed. In 2013, 19 new contracts were developed on 458 acres that will provide 527 tons of salt control when fully implemented. The new systems are about equally split between improved surface systems and sprinkler systems. The project has attained slightly over 60 percent of its salt control goal.

Uinta Basin, Utah

Implementation began in this unit in 1980. The original salt control goal was reached several years ago but about 60,000 acres might still be improved. Producer participation is exceeding the original projections. Thirty three new EQIP contracts were reported in September. These contracts obligate nearly $2.3M to control about 1248 tons of salt. All irrigation improvements were either sprinklers, buried pipelines or a combination of the two. Installation of a Reclamation-funded project near the city of Roosevelt accelerated the rate of applications in Duchesne County.

As in the Lower Gunnison Basin, there are expectations that the soon-to-be-released Uinta Basin Comprehensive Plan will identify actions to increase participation in the program.

Price-San Rafael, Utah

This project is approaching 60 percent achievement of its salt control goal and continues to be the project (of the twelve) with the best cost effectiveness. In 2013, 50 new contracts obligated for about $2.9M on 1691 acres. When implemented, these measures will control about 5054 tons of salt. The installation of the next phase of the Cottonwood Creek Irrigation Company's pipeline projects is generating significant applications for the EQIP.

Muddy Creek, Utah

There was one new contract developed in the Muddy Creek area in 2013 for about $214,000.

Green River, Utah

There were no new contracts in the project area in 2013. Interest remains high but off-farm infrastructure improvements are needed to allow on-farm systems to operate properly and efficiently. Irrigation continues to expand, particularly on the plateau to the east of the Green River but, as all of the new irrigation systems are high-efficiency sprinklers, NRCS does not anticipate a significant increase in salt loading to the river. These expansions are not eligible for EQIP assistance.

Big Sandy River, Wyoming

Implementation has been underway in this unit since 1988. Approximately 13,500 acres of the planned 15,700 acres have been treated (86 percent) and about 68 percent of the salt control goal has been reached. Producers also report that the water savings from improvements in irrigation systems now allows a full irrigation season of water for the entire irrigation district. In 2013, there were four new contracts on 122 acres for $179,000.

Table 2 - USDA Salinity Control Unit Summary
Thru 2012

Unit	[1]Controls (tons)	Potential (tons)	Percent of Goal	Costs	Annualized Costs	Projected total cost	[2]Cost/ton
Mancos River, CO	4,325	11,940	36%	$6,849,366	$567,812	$18,909,001	$131
Muddy Creek, UT	61	11,677	1%	$117,812	$9,767	$22,552,307	$160
Manila-Washam, UT	8,149	17,430	47%	7,027,276	$582,561	$15,030,730	$71
Silt, CO	2,139	3,990	54%	$3,998,487	$331,475	$7,458,608	$155
McElmo Creek, CO	29,289	46,000	64%	$22,420,893	$1,858,692	$35,213,257	$63
Uinta Basin, UT	149,741	140,500	107%	$111,335,705	$9,229,730	$104,464,820	$62
L. Gunnison, CO	112,987	186,000	61%	$74,120,491	$6,144,589	$122,017,677	$54
Price/San Rafael, UT	88,616	146,900	60%	$43,891,498	$3,638,605	$72,759,559	$41
Grand Valley, CO*	148,440	132,000	112%	$56,713,677	$4,701,564	$50,432,534	$32
Big Sandy, WY	56,810	83,700	68%	$13,560,491	$1,124,165	$19,979,107	$20
Green River, UT	178	6,540	3%	$86,940	$7,207	$3,194,312	$40
Totals	600,735	786,677	76%	340,122,636	$28,196,167	$472,011,913	$47

[1]Includes Off-farm funded with EQIP or Basin States Parallel funds
[2]Cost per ton based on amortization over 25 years at 6.625% interest.
**Grand Valley includes 35,300 tons for on-farm ditches, not part of in-field control.*
Since 2010, 5,457 tons of out-of-project salt control has been contracted at a weighted cost per ton of $156.

Agricultural Research Service

The Agricultural Research Service (ARS) is cooperating with the BLM and the USGS through a grant from the BSP to conduct a study, "***An evaluation of the effects of selected rangeland conditions on the sources of transport of dissolved solids delivered to streams in the Upper Colorado River Basin.***" The total project cost is $537,000 of which BLM is providing $100,000, the BSP is providing $231,000 and the Federal partners are providing the remainder. ARS is conducting Phase I and Phase II of the six phase study and will "hand-off" its products to the USGS to conduct the remaining four phases. The entire project is scheduled for completion in the 2nd quarter of FY 2014.

ARS has established it's project team that consists of Dr. Cole Rossi (Soil Scientist), Dr. Mark Weltz (Rangeland Hydrologist), Mr. Joe Makuch (Technical Information Specialist, National Agricultural Library (NAL), Mr. Stuart Gagnon (Librarian, NAL), Dr. Kossi Nouwakpo (Post-Doctoral Soil Scientist), Mr. Christo Morris (Range Science Technician), and a research librarian (NAL) yet to be hired. Only Dr. Nouwakpo and the research librarian are receiving BLM funds; the remainder of the team is participating in-kind. BLM provided $100,000 to ARS through an interagency agreement executed in early September. The NAL crew created an initial salinity literature citation assessment and sent it to a few select salinity partners/review panel members for feedback regarding selection of salinity-related key words, practices, and known works and reports. Dr. Rossi reported to the CRBSC Forum Workgroup at its September 2012, meeting in El Segundo, California. She reported her team will be assisting her to complete Phase I and Phase II of the study, reviewed the timetable for the reports (BLM progress report due 12/31/2012; final literature review and synthesis due 2/2013).

The initial panel review for salinity citations has been established with representative from most Federal agencies and with at least one representative from six of the seven basin states. The ENDNOTE 6© software has been purchase for the core team to track citations and minimize duplication. Dr. Rossi anticipates providing a web-link to a share link for the interactive library so that participating panel members can determine if a citation has already been included on the NAL list. Two citation lists are established: One for accepted citations and one for citations being considered. The web-link will also include a document to highlight concepts wanted and concepts not wanted so that the team can minimize "mission creep" and keep the focus on the project's true objective. Dr. Nouwakpo has begun synthesizing citations that have been accepted into the salinity database library. Dr. Rossi plans to give a presentation summarizing Phase I to the CRBSC Workgroup at its anticipated meeting in February 2013.

Environmental Protection Agency
Colorado River Basin Salinity Control Program
Fiscal Year 2013

During Fiscal Year 2013, EPA continued to provide coordination and assistance to the Colorado River Basin Salinity Control Forum and the Advisory Council. Several key items;

- The renewed Colorado River Basin Salinity Control Advisory Council Charter was signed by the EPA Administrator on October 16, 2012.

- EPA provided informational updates to the Forum and Advisory Council including updated State and Tribal Water Quality Standards and related program information.

- EPA Region 8 has assumed the lead role for EPA Regions 6 and 9 for coordination with the Forum and Advisory Council and continues to be available for responding to questions, requests, and other needs.

- EPA provided coordinated National Environmental Policy Act (NEPA) and Clean Water Act Section 404 program reviews on the Henry's Fork Salinity Control project draft Environmental Impact Statement (EIS).

- In response to the invitation from the Bureau of Reclamation, EPA became a Cooperating Agency in the Bureau's development of an Environmental Impact Statement for potential changes at the Paradox Valley Salinity Control Unit in Colorado. The Regional Salinity Control coordinator, NEPA program Lead Reviewer and the permit specialist in the Underground Injection Control program have been coordinating in an effort to support this important EIS development effort.

The attached table indicates the current status of all the Colorado River Basin States in adoption of the Colorado River Basin Control Forum's salinity standards (Policies and Plan of Implementation).

EPA has approved the applications of five Tribes within the Colorado River basin for "Treatment as States" (TAS) for delegation of the Water Quality Standards (WQS) program on their respective tribal lands, and four tribes have approved WQS. Specifically;

- The WQS for the **Ute Mountain Ute Tribe** were approved by EPA Region 8 on October 19, 2011. The Tribe has salinity and selenium standards and has several on-going selenium and salinity projects examining potential effects on groundwater, irrigation and endangered species in Tribal and downstream waters.

- The **Hualapai Tribe** adopted revised WQS in July 2009, including the 2008 Forum Policies and Plan of Implementation. These revised standards were approved by EPA Region 9 September 25, 2009.

- The **Navajo Nation** adopted revised WQS in May 2008 that included the 2005 Forum Policies and Plan of Implementation; the revised WQS were approved by EPA, Region 9 in March 2009. They have developed draft WQS that refer to the 2011 Forum WQS and conducted their public process on this revision but have not yet completed their action to adopt.

- The **Hopi Tribe** included the 2005 Forum Policies and Plan of Implementation in WQS revisions which were adopted by the Tribe March 21, 2011, and approved by EPA Region 9 on August 24, 2011.

- The **Havasupai Tribe** received its TAS approval on April 26, 2011; EPA Region 9 is working with the Tribe in completing development of their WQS.

The adopted and approved WQS for the four Tribes have been published and are available for review on-line.

COLORADO RIVER BASIN SALINITY CONTROL STANDARDS UPDATE
Basin States Adoption of Salinity Standards & Plan of Implementation Updates
September 2013

EPA Region – State	2005 Update Adopted* by State	2005 State Adoption Approved by EPA	2008 Update Adopted* by State	2008 State Adoption Approved by EPA	2011 Update Adopted* by State	2011 State Adoption Approved by EPA
R9 – Arizona	Yes - 12/02/08	Yes – 1/21/09	In draft	--	In draft	--
R9 – California	Yes – 2/01/06	Yes – 3/16/06	Yes – 8/04/09	Yes – 3/09/10	In draft	--
R9 – Nevada	Yes – 9/06/06	Yes – 4/05/07	Yes - 10/05/10	Yes – 6/15/11	Yes – 10/11/12	Yes – 2/12/13
R8 – Colorado	Yes	Yes	Yes - 12/08/08	2005 adoption reaffirmed	Yes – 12/12/11	2008 adoption reaffirmed
R8 – Utah	Yes – 10/22/08	Yes – 9/30/09	Yes - 10/22/08	Yes – 9/30/09	Yes – 4/1/12	Yes – 11/20/12
R8 – Wyoming	Adopted by reference – Water Quality Rules and Regulations (1982)					
R6 – N. Mexico	Yes – by reference in WQS	Yes	Earlier version not changed	April 2011	In draft	--

* Adopted/Approved – Some states chose not to adopt Forum Standards during previous review periods because the salinity standards had not changed significantly.

Fish and Wildlife Service
Colorado River Basin Salinity Control Program
Fiscal Year 2013

The Fish and Wildlife Service (Service) salinity coordinator, Barb Osmundson, has attended salinity work group and forum meetings during the past year in San Diego, CA, Grand Junction, CO, Salt Lake City, UT, and will be present at the upcoming meeting in Los Angeles, CA. She has been called upon to address issues related to both salinity control projects and wildlife replacement efforts. She anticipates continued involvement with the assessment of past and future wildlife replacement efforts, as well as involvement with the environmental review of salinity control projects, including Paradox Valley Unit cooperating agencies meetings.

Environmental Review of Salinity Control Projects

Barb assisted the Cheyenne, Wyoming Service office in the review and preparation of comments addressing the Henry's Fork Draft Environmental Impact Statement (DEIS). This document provided a programmatic National Environmental Policy Act (NEPA) analysis of on-farm irrigation system improvements and some on-farm water delivery ditches to reduce salt loading contributions of the Upper Henry's Fork River to the Colorado River system from irrigated agriculture. More recently, Barb has reviewed the draft Environmental Assessment (DEA) for the C Ditch/Needle Rock Pipeline Project, Delta County, Colorado. In accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended ((16 U.S.C. 1531 et. Seq.), and the Interagency Cooperation Regulations (50 CFR 402), Barb prepared biological opinions for the following projects: Horsethief Canyon State Wildlife Area (SWA) bank stabilization project, the Minnesota Canal and Reservoir Company canal piping project, the Stewart Ditch and Reservoir Company canal piping project, and the Grand Valley Wildlife Replacement Project. The Horsethief Canyon SWA bank stabilization project provided protection from erosion from Colorado River flows for a past wildlife habitat replacement project located in the Grand Valley Unit. The Minnesota Canal and Stewart Ditch projects are salinity control projects in the lower Gunnison Unit. And the Grand Valley Replacement Project involves approximately 490 acres of replacement habitat in the Grand Valley Unit.

An increased need for ESA consultation may occur in the future, if the yellow-billed cuckoo, a candidate species, is placed on the endangered species list. The Service is responsible for identifying species in need of protection under the Endangered Species Act of 1973 (ACT), as amended. The western distinct population segment of the yellow-billed cuckoo has been a candidate for listing under the Act since 2001. There will be a proposed listing rule coming out this September 2013, with a critical habitat proposal following in November. It could conceivably be listed by this time next year.

Critical habitat identifies the geographical areas containing features essential for the conservation of the species. The western yellow-billed cuckoo is a riparian obligate species historically known from parts of the 12 States west of the continental divide; including Washington, Oregon, California, Idaho, Nevada, Utah, Arizona, and parts of Montana, Wyoming, Colorado, New Mexico, and Texas. The yellow-billed cuckoo is a secretive, robin-sized bird that breeds in willow and cottonwood forests along rivers and streams. It appears to require large blocks of

dense riparian forested habitat consisting of older trees (typically cottonwood) with a vegetative understory component of shrubs and smaller young trees. It eats primarily large insects such as katydids, caterpillars, and cicadas. Biologists estimate that more than 90 percent of the bird's riparian habitat in the West has been lost or degraded as a result of conversion to agriculture, dams and river flow management, bank protection, overgrazing, and competition from exotic plants such as tamarisk and giant reed grass.

Designation of critical habitat does not affect land ownership or establish a refuge or preserve and has no impact on private landowners who are taking actions on their own property that do not require a Federal nexus such as through funding, permit, or authorization. Critical habitat designation does mean that Federal agencies that undertake, fund, permit, or authorize activities that may affect critical habitat are required to consult with the Service to ensure that such actions do not adversely modify or destroy that habitat. Salinity control projects or habitat replacement projects that involve riparian habitat (such as non-native vegetation removal) may need to be surveyed for presence of yellow-billed cuckoos and may need to engage in ESA Sec. 7 consultation. The Service is currently working with NRCS in Grand Junction regarding conservation measures for yellow-billed cuckoo habitat in the wildlife replacement project planned in the Grand Valley Unit.

Wildlife Replacement Activities

Barb prepared a Service letter to USDA and the NRCS State Conservationist stating approval for the Grand Valley wildlife habitat replacement project associated with the Grand Valley Salinity Control Project in November, 2012. This approval enabled the project to advance to planning and preparation for approximately 490 acres of wildlife habitat replacement credit, bringing the Grand Valley unit to 100 percent of the concurrent acreage replacement goal. Barb has tried to help expedite processes involved with seeing this project move forward by maintaining communication with Colorado Parks and Wildlife (CPW) and NRCS staff in Grand Junction, and working through any concerns and hold-ups during project development. This project involves the improvement of wildlife habitat on five properties managed by CPW adjacent to the Colorado River near Grand Junction. Removal of tamarisk, Russian olive, and noxious weeds will allow herbaceous ground cover to be re-established at the properties. The project also includes planting cottonwood trees and willows.

Barb prepared a Service letter of approval to the Utah State Conservationist, supporting a proposal from NRCS for changing the HEP driven accounting process to a predetermined replacement rate of 2 acres of habitat developed or significantly enhanced for each 100 acres of irrigation system improvements. Also, wildlife habitat losses resulting from irrigation improvements will be replaced on a 1:1 acreage basis. The HEP process was an effective tool to measure the impacts and to determine the habitat replacement needs to offset the habitat values lost from making the irrigation improvements for salinity control. However, the use of the full analysis process was consuming too much of the field biologists' time and reduced their opportunities to promote and develop good habitat replacement projects with willing landowners. This change is in line with Colorado NRCS, and we hope that this change will allow Utah NRCS biologists to focus their efforts on implementing quality habitat replacement projects with willing landowners.

Field visits were made to potential and existing wildlife replacement sites, including Horsethief SWA in the Grand Valley Unit, and Escalante SWA and Billy Creek SWA in the lower Gunnison Unit. Most recently, a site visit was conducted to assess the potential for the Linman Ranch Habitat Project as potential habitat replacement for habitat loss associated with the Crawford Clipper Ditch project in the lower Gunnison Unit. During the same trip, a visit was made to the wildlife replacement site for the Grandview Mesa project, to assess progress of habitat development and success of vegetation plantings. The Service gave verbal approval for the Linman Ranch project. Field visits to Utah habitat replacement sites are scheduled for early October.

Barb attended a meeting in Price, Utah in January in which discussion topics included procedures for habitat evaluation, and deciding which agency was responsible for NEPA analysis for wildlife replacement projects. In March, she participated in a webinar hosted by the Colorado Natural Heritage Program (CNHP). The goal of this webinar was to better understand what the CNHP does, and explore how our habitat replacement goals may overlap with their conservation goals. Barb has been involved with the Grand Valley Riparian Restoration Collaborative to help identify potential wildlife replacement sites in the Grand Valley and lower Gunnison salinity control unit areas. She recently participated in an August conference call hosted by Travis James to explore wildlife replacement options for the Henry's Fork Salinity Control Unit. Other participants included several NRCS employees and a representative from Trout Unlimited. At the present time, it is believed that only 129 acres of wildlife replacement habitat are potentially available to offset approximately 800 acres of wetland impacts associated with full implementation of the Henry's Fork salinity control unit. Given the relatively small amount of in-kind and in-place wildlife habitat replacement identified to date, we will have to be creative with potential habitat replacement projects. Potential project types discussed included: off-site replacement projects, stream habitat improvement projects, terrestrial habitat projects, noxious weed treatment projects, and diversion replacement projects. This group plans further discussions, and hopes to involve local state fish and game agency employees as partners in identifying future habitat replacement projects.

Paradox Salinity Control Unit

Barb has represented the Service at all Paradox cooperating agencies meetings in June, July, and August. Discussions involved development of a no-action alternative and exploration of potential salt control methods. She will participate at the planned field tour at the Brine Injection Facility, Surface Treatment Facility, and Brine Collection Wells, and the potential well and evaporation pond sites in the Paradox Valley scheduled for the end of September. She presented a talk about the Migratory Bird Treaty Act at the May salinity control forum meeting in Grand Junction, and discussed potential environmental hazards associated with evaporation ponds. The draft meeting minutes provided by Don Barnett contain an excellent summary of the presentation and the discussion that followed.

Review of Monitoring and Evaluation (M&E) Reports

In March, Barb provided comments back to Ed Neilson in the Grand Junction NRCS office after reviewing draft M&E reports written by Frank Riggle for salinity control units in Colorado.

These comments were in turn forwarded to NRCS State Office.

After review of the NRCS 2012 monitoring and evaluation reports, the Service has assessed the progress of NRCS in replacing fish and wildlife habitat forgone as a result of implementing salt control measures. A table was prepared to evaluate and compare salinity control units (SCU's) to determine whether wildlife habitat replacement is concurrent with the acres of salt control projects completed to date. The Big Sandy SCU in Wyoming is concurrent with wildlife habitat replacement acres, and the wildlife replacement goal is exceeded by 10 acres. For the state of Colorado, NRCS associated with the Mancos Valley and McElmo Creek SCU's has greatly exceeded wildlife habitat replacement goals, and are at 258 percent and 155 percent respectively. For the state of Utah, NRCS associated with the Price-San Rafael and Uinta SCU's have exceeded the recently adopted replacement goal of 2 acres of wildlife replacement habitat per 100 acres of salt control projects, at 7.1 percent and 13.7 percent respectively. It should be noted here that inventories completed on habitat replacement sites may likely result in a reduction of acres considered habitat replacement. Major reasons for this issue provided in some of the M&E reports include urban development, changes in land management, and changes in land ownership. To be concurrent with salinity control project implementation and to replace additional habitat replacement acres lost during the life of the salinity control projects, NRCS will need to continue to emphasize habitat replacement as a high priority for the agency.

Salinity control units that are not concurrent with wildlife habitat replacement acres in Colorado include; the lower Gunnison, Grand Valley, and Silt. With the signed contract for the future Grand Valley wildlife replacement project, the Grand Valley is expected to meet and exceed replacement acreage goals and become concurrent. An issue identified with the Silt SCU is that there are only a few landowners that are interested in habitat improvement projects. An issue identified with the lower Gunnison SCU is that only small parcels are currently available for habitat projects. These small projects are complex in planning and habitat enhancement options, and they provide relatively small acreages per project. NRCS has made additional efforts in the Gunnison SCU with wildlife habitat only sign-ups to engage various conservation groups and other Federal and State agencies to accelerate the implementation of wildlife habitat enhancement projects. A goal of NRCS is to encourage habitat replacement projects with better connectivity and a longer-term life expectancy. Those SCU's in Utah not concurrent with wildlife habitat replacement include; Manila-Washam SCU, Green River SCU, and Muddy Creek SCU. The Muddy Creek and Green River SCU's have not really gotten off the ground yet and have little on-farm treatment, and thus no wildlife habitat replacement. NRCS efforts to plan and apply additional acres of habitat replacement will continue. The Service will continue to work with NRCS to identify and solve issues connected with wildlife replacement projects, and to help identify potential replacement opportunities. Most of the wildlife habitat replacement projects require time to become fully functional and reach their full habitat potential. For example, it takes a long time for planted cottonwood trees to develop into a mature gallery. Continued follow-up by NRCS is critical to support landowners with project implementation, and to assure that reported program habitat replacement goals are maintained. Any acres lost during the life of the salinity control program will need to be replaced to maintain a concurrent status.

Table 3 - Summary of wildlife habitat replacement in salinity control units for 2012						
Salinity Control Units	Habitat Acres Acquired in 2012	Habitat Acres Cumulative Total	% Goaled Acres	Total Needed Acres	Remaining Acres Needed to be Concurrent	Comments
Colorado						
Lower Gunnison Unit	131	1008	81%	1246	237	Small parcels for habitat projects, 62306 salt control acres thus far 115,000 acres full salt control project implementation
Grand Valley	17	752	62%	1206	454	Cancellation rates of EQIP contracts reduced with separate wildlife contracts Urban development, changes in management, and changes in land ownership are major reasons acres sometimes don't meet habitat replacement criteria Use HEP scoring, Contract under way=Concurrent 60,000 acres full salt control project implementation, adjusted full potential=42,800 acres, with 41,989 to date
Mancos Valley	None	137	258%	53	None	To date 2637 acres salt control 5400 acres full salt control project implementation
McElmo Creek	2.1 wetland 11.0 upland	451	155%	292	None	To date, 14,608 acres 21,550 acres full salt control project implementation

Silt	None	19.4	39%	40 riparian/upland 10 wetland	8 for concurrent 27 for total	Only a few landowners interested in wildlife habitat To date 1501 acres salt control, 2800 acres full salt control project implementation
Utah						
Green River	None	None	None	41.6 with full implementation	2	In 2012, only 1 contract for salt control on 96 acres 2080 acres full salt control project implementation Project hasn't taken off the ground yet
Manila-Washam	None	7	0.20%	68.1	61.1	7780 acres full salt control project implementation To date, 3405 acres salt control
Price-San Rafael	463	2061	7.1%	None	None	Problem with enough staff to do M&E of habitat replacement projects 45,000 acres full salt control project implementation To date 31,000 acres salt control
Uinta	112	21,065	13.7%	None	None	Problem with WRAP property and Hancock Government Canal piping project 160,000 acres full salt control project implementation To date, 154,225 acres salt control

Table 3. cont'd. Summary of wildlife habitat replacement in salinity control units for 2012.						
Salinity Control Units	Habitat Acres Acquired in 2012	Habitat Acres Cumulative Total	% Goaled Acres	Total Needed Acres	Remaining Acres Needed to be Concurrent	Comments
Muddy Creek	None	None	None	121	121 with full project implementation	Project hasn't taken off the ground yet. Lack of off-farm irrigation infra-structure is impeding the creation of on-farm grant opportunities 6050 acres full salt control project implementation
Wyoming						
Big Sandy	None	860				10.77 additional acres replaced and goal exceeded by 10 acres. To date, 12,791 acres treated for salt control. 15,700 acres full salt control

U.S. Geological Survey
Colorado River Basin Salinity Control Program
Accomplishments for Fiscal Year 2013

The U.S. Geological Survey (USGS) conducts a variety of science activities to aid in the assessment of salinity conditions in the Colorado River, guide program management decisions, and to determine the effect of salinity control efforts. These activities are conducted in cooperation with the Colorado River Basin Salinity Control Forum (CRBSCF) and in support of Federal resource management agencies including the Bureau of Land Management (BLM), Bureau of Reclamation (Reclamation), and the Natural Resources Conservation Service (NRCS). In addition, activities and accomplishments in USGS National programs such as the National Streamflow Information Program (NSIP) and the National Water-Quality Assessment (NAWQA) Program provide valuable information to Salinity Control Program (SCP) agencies. These SCP science-support activities and relevant USGS National program activities (described below) range from data collection in a basin-wide monitoring network, to research on the fate and transport of salt at various scales.

Colorado River Basin Monitoring Network and Basic-Data Collection

The USGS monitors 20 key stream sites (stations) in the Colorado River Basin extending from near the headwaters to the Mexican border. Salinity data at the 20 stations are used to assess compliance salinity-level criteria and also track trends in long-term data sets as related to salinity control work. Specifically, the program of water-quality monitoring consists of three levels:
(1) monitoring for evaluation of individual salinity control measures, (2) stateline monitoring, and (3) monitoring for determination of annual average flow-weighted concentration in the lower main stem.

Figure 2 - Location of monitoring sites in the 20-station network

The Reclamation-developed planning model, known as the Colorado River Simulation System or CRSS, incorporates data from the monitoring network to simulate both flow and salinity throughout the Colorado River Basin. Each year the USGS computes continuous and monthly total dissolved solids (TDS) concentrations and loads based on data gathered at the 20-station network using the USGS SLOAD model.

In 2012, the USGS provided a report to Reclamation reviewing monitoring at the 20-station network and a summary of that report was included in the 2012 Federal Accomplishments Report. The review showed an improvement in the quantity of water quality data collected in the

network from 2010 to 2012. In 2013, federal budget cuts threatened the operation of gages in the UCRB. Only minor changes in funding source occurred for gages in the 20-station network, however, and reductions in data collection were avoided. The USGS Green River at Greendale was upgraded in 2013 from periodic measurement of specific conductance (SC, used to estimate total dissolved solids concentration) to continuous monitoring of SC.

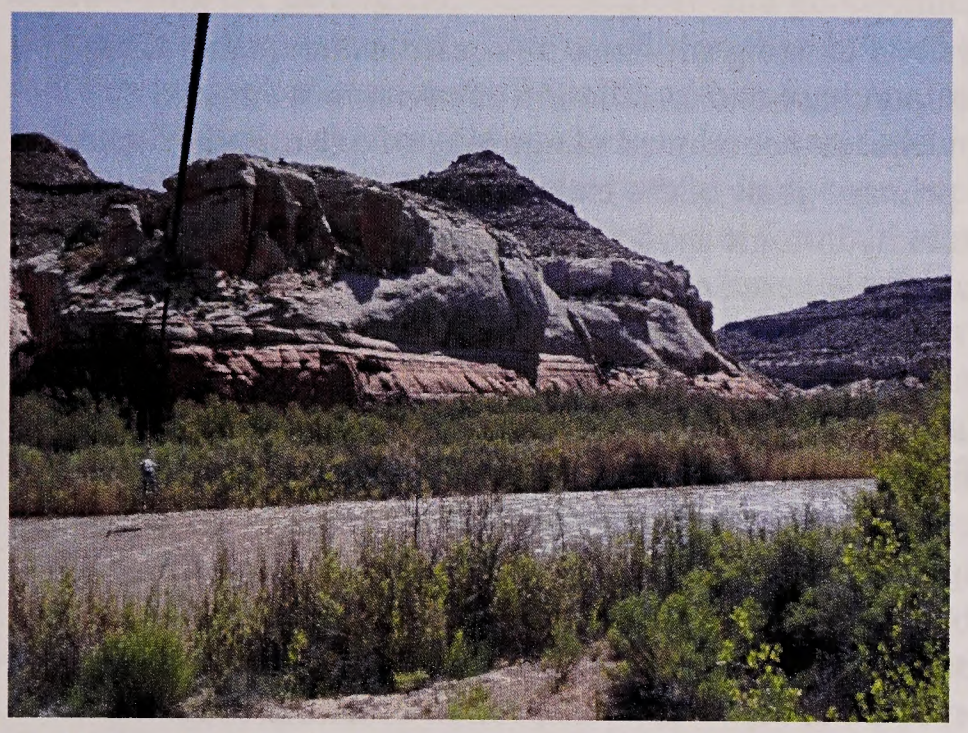


Figure 3 - USGS cable way at the Dolores River near Cisco gage station

In 2010, the USGS began evaluating new methods to model and deliver monitoring data from the 20-station network including estimated salinity load at network gage sites. During mid-term Reclamation studies, water-quality results in the CRSS model were substantially impacted by initial model conditions, which included salinity concentrations downstream of major reservoirs such as Lakes Powell and Mead. New modeling methods that provide more timely salinity concentration data would reduce uncertainty in CRSS model predictions. The USGS in cooperation with Reclamation and the CRBSCF has developed a process that allows us to serve real-time salinity estimates, based on SLOAD model results, on the World Wide Web (specifically, USGS National Real Time Water Quality, http://nrtwq.usgs.gov). This will provide for more timely incorporation of load estimates in the CRSS model. USGS is finalizing the web application for serving out salinity load estimates in real time and data for selected 20-station network sites will begin to be shown on-line in the first quarter of FY2014. Initially the Hoover Dam and Whitewater sites will be tested and posted, but real time equations and web postings for all 20-station gages should be available and approved in FY2014. The USGS is also working on a report that will contain salinity equations for several additional (non 20 station) sites. These sites are located in Colorado and are intended to assist Reclamation and the Salinity Control Forum in monitoring important areas such as the Paradox Basin and Glenwood Springs areas. This report is near the end of the USGS review process and should be finalized in December 2013.

Documenting the Effects of Grazing on Sediment, Water, and Salinity Production from Mancos Shale soils – Badger Wash, Colorado

The Badger Wash (BW) study area provides a unique opportunity to assess impacts of domestic grazing on run-off and erosion processes of the Mancos Shale. The study area has 8 paired watersheds (ranging in size from 12 to 107 acres) with one of each pair fenced in 1953 to exclude domestic livestock and the other open to grazing. The area has been grazed by domestic livestock since the late 1800s, primarily by cattle but early settlers grazed sheep extensively. In arid and semi-arid ecosystems, overgrazing often results in decreased vegetative cover, increased soil compaction, and breaking up of stabilizing soil crusts, leading to increased run-off and

erosion. Such changes to hydrology and erosion are of particular concern for soils derived from saline parent material (such as Mancos Shale) due to potential negative impacts on in-stream water quality. Since 2006, the USGS has used the grazing treatments and subsequent variability in soil and vegetation attributes to address basic questions related to soil and hydrologic processes on the Mancos Shale.

Activities in 2013 included further analysis of existing silt fence in-stream water quality data, installation of an additional 50 silt fences, purchase and installation of two new weirs and addition of stilling wells at two existing weirs, and continued monitoring of existing silt fence and in-stream water quality. One of the primary goals of the expanded silt fence and weir networks is to facilitate parameterization in hydrologic models to enable land managers to estimate run-off and erosion from Mancos Shale based on basic topographic, soil, and vegetation attributes.

Study results demonstrate that erosion rates continue to be significantly greater in areas with gentle topography (rolling) open to grazing than where grazing has been excluded. In contrast, there was no difference in erosion between grazed and ungrazed on the steep slopes. Estimation of the slope effect indicates erosion is significantly positive correlated with slope on rolling topography where grazing is occurring but not where grazing has been excluded. Grazing history did not affect EC or concentration of As or Ca of eroded sediment. In-stream flow did not differ in average EC or concentration of Ca or As. Visual inspection of within event EC indicates that ion concentration of run-off is generally responding in parallel between grazed and ungrazed watersheds.

The significant interaction of slope and grazing treatment suggests that grazing (current or historic) has altered soil and/or vegetation properties such that the relationship between site erodability and slope is now different between the two watersheds. The lack of consistent difference between grazing treatments in the salinity of eroded sediment and of in-stream flow (as measured by EC or elemental concentration) suggests that *if* broad scale surface disturbing activity on Mancos Shale derived soils is negatively effecting salinity of downstream waters, it is not due to greater salinity of overland-flow originating in disturbed areas but simply to increases in quantity of saline runoff originating from disturbed areas.

Mineralogical Controls on Salinity and Related Elements Impacting the Pariette Draw and Wetland, Utah

The Utah Division of Water Quality determined that Pariette Draw (PD) is in violation of water quality criterion for total dissolved solids (TDS), selenium (Se) and boron (B) due to nonpoint contamination. Daily loads of contaminants have been characterized, but little is known about the impact of bedrock and soil mineralogy on salt storage and the water-rock interactions that control mobility of salt and high concentrations of Se and B. Studies in the Uncompahgre River watershed in Colorado by the USGS show that salt derived from weathering shale in a semi-arid climate is stored in a variety of minerals that contribute solutes based on a complex set of conditions. Selenium and B commonly reside in salt phases, so knowledge of the behavior of salt sheds light on the behavior of associated contaminants.

Land managers, including the BLM, must decide whether or not the salt, Se, and B contaminants in the watershed can be managed, and what sustainable mitigation strategies are possible. To accomplish this, knowledge about the source, cycling, and transport of contaminants throughout the watershed and the effect of land-use practices is critical. The USGS, in cooperation with the BLM, Reclamation, and the Utah Department of Environmental Quality are finishing a study that is providing the geological, mineralogical, and geochemical data needed to model these processes in the watershed. This model can then be used to answer questions ranging from viability of contaminant control to strategic mitigation design. During the study, the USGS collected samples at sites that weather under natural and irrigated condition. Samples include soil profiles from cultivated and the natural landscape, rock from the formations that crop out in the watershed, and surface- and groundwater from streams, ponds, springs, and auger holes. A subset of sites was sampled multiple times throughout the year to determine potential seasonal and irrigation effects on nonpoint contamination. Data have been compiled for samples collected in 2011 and used to construct working hypothesis regarding the residence of contaminants and changes related to pedogenesis, contaminant transport, and land use. Data for samples collected in 2012 will be used to test these working hypotheses. A USGS Open File Report documenting this work is scheduled for publication in the spring of 2014.

Hydrogeologic Characterization of the Paradox Valley and evaluation of alternatives for salinity reduction for the Paradox Valley Unit, Montrose County, Colorado

The Dolores River, a tributary of the Colorado River, picks up an estimated 115,000 to 200,000 tons of salt annually as it crosses the Paradox Valley. Reclamation, as part of the Colorado River Basin Salinity Control Program, developed and currently operates the Paradox Valley Unit (PVU) to intercept brine before it discharges to the river. The estimated salt-load reduction by the PVU is about 10 percent of the total salt-load reduction of the SCP and 25 percent of the salt-load reduction by Reclamation projects. Current projections are that the useful life of the PVU injection well is an additional 3 to 5 years. Reclamation, with concurrence of the CRBSCF, determined that alternatives need to be evaluated in order to select the best option(s) to continue brine removal into the future. Possible future mitigation alternatives include: (1) Reducing recharge on the valley floor through modification of surface-water impoundments and or watercourses, and changing irrigation practices, and (2) managing (increasing) the stage of the Dolores River in the valley to decrease the groundwater gradient and flow between the aquifer and the river.

The USGS has completed a study developing conceptual and numerical computer models of the area groundwater flow system to aid in the evaluation of these and other potential alternatives. A better understanding of the hydrogeology, the spatial and temporal distribution of recharge, groundwater flow, dissolution of salt, and stream-aquifer interactions will allow for the assessment of potential

Figure 4 - Paradox Valley

hydrologic responses to proposed salinity control alternatives. A USGS Scientific Investigations Report documenting the conceptual and computer groundwater flow model, and the data incorporated in those models is schedule to be published in December 2013.

To increase the amount of quantitative data to support modeling, the USGS in 2013 conducted a long-term aquifer test utilizing existing Paradox Valley Unit brine-production wells and nearby monitoring wells. Monitoring wells were instrumented with multi-parameter sensor-transducers to monitor changes in water levels, temperature, and specific conductance. Pressure transducers were installed at existing conductance monitoring sites in the Dolores River to monitor stream stage and water temperature. Analytical and numerical models were used to analyze the aquifer-tests data to determine hydraulic properties of the aquifer and effects of the position of the freshwater-brine interface on brine discharge to the river.

Calibration of the three-dimensional numerical model indicated that temporal variations in brine discharging to the Dolores River primarily are related to variations in infiltration of water (irrigation return flow and conveyance losses) in the western part of the valley and to seasonal variations in stage of the Dolores River. This suggests that water-management operations that reduce freshwater heads and hydraulic gradients in the alluvial aquifer could affect discharge of brine to the river. The processes and parameters that control these responses, however, are complex. Beginning in October 2013, the USGS will apply the groundwater flow model to evaluate potential effects from hypothetical changes in infiltration rates beneath irrigated land; river stage that would result from installation of low-head dams in selected reaches of the Dolores River; and as a result of operations of the managed wetland near the Dolores River.

Statistical Modeling (SPARROW and LowGunS) Applied to Assessing the Distribution of Salinity Loads and Load Sources in Streams of the Colorado River Basin

Modeling tools: The USGS has developed two models to assess the distribution of salinity loads in surface waters and sources of those loads in the UCRB: (1) The Upper Colorado River Basin SPARROW (Spatially Referenced Regressions on Watershed Attributes) model and (2) The Lower Gunnison River Basin Water-Quality model (LowGunS) . These models represent the surface-water flow system at a basin and sub-basin scales and are based on conceptual models that relate observed loads in UCRB streams to up-basin physical characteristics including elevation, precipitation, geology, land cover, and land and water use. Both models estimate salinity load and load sources and can be used to improve SCP managers' and planners' understanding of the salinity-load balance and to prioritize and optimize SCP resources toward efficient and cost-effective control projects.

Model estimates are currently being used by SCP participating agencies to meet a variety of information needs. Work continues, however, to enhance the accuracy and utility of these models as part of SCP science planning.

Upper Colorado River Basin salinity modeling tools -SPARROW 2.0: The development of the USGS Upper Colorado River Basin SPARROW model (UCRB SPARROW model) was motivated by the need of SCP managers for improved understanding of the spatial distribution of salinity sources, load accumulation, and transport mechanisms in the UCRB. The objective was

to develop the best possible tool that would allow managers to better understand and estimate load distribution and yield to streams in any area of interest, even if little or no data were available for that area. The UCRB SPARROW model provides that tool by relating measured transport at monitoring stations to upland catchment attributes including contributing upstream reaches, and extrapolating those relations to un-monitored catchments.

The UCRB SPARROW project has developed statistically-based estimates of dissolved-solids loading sources and transport for reaches at the sub-watershed level throughout the UCRB. Predictions of dissolved-solids loads are now available for more than 10,000 stream reaches of the stream network defined in the UCRB. From these estimates, the downstream accumulation of dissolved solids, including natural and agricultural components, can be examined in selected rivers. A USGS Scientific Investigations Report documenting the modeling effort was published in May 2009. A web-accessible interactive map also was developed and populated with input and output data from the study. The report and the interactive map product are available at http://pubs.usgs.gov/sir/2009/5007/. The model is currently being used by Reclamation and NRCS to establish estimates of load from agricultural land use outside of designated salinity-control project areas and, more recently, to assess the magnitudes of loads derived from natural landscapes and rangelands. Model results are also being compared to estimates using other methods including those based on limited (quantity and period of record) data sets to determine whether additional work is needed to improve load estimates.

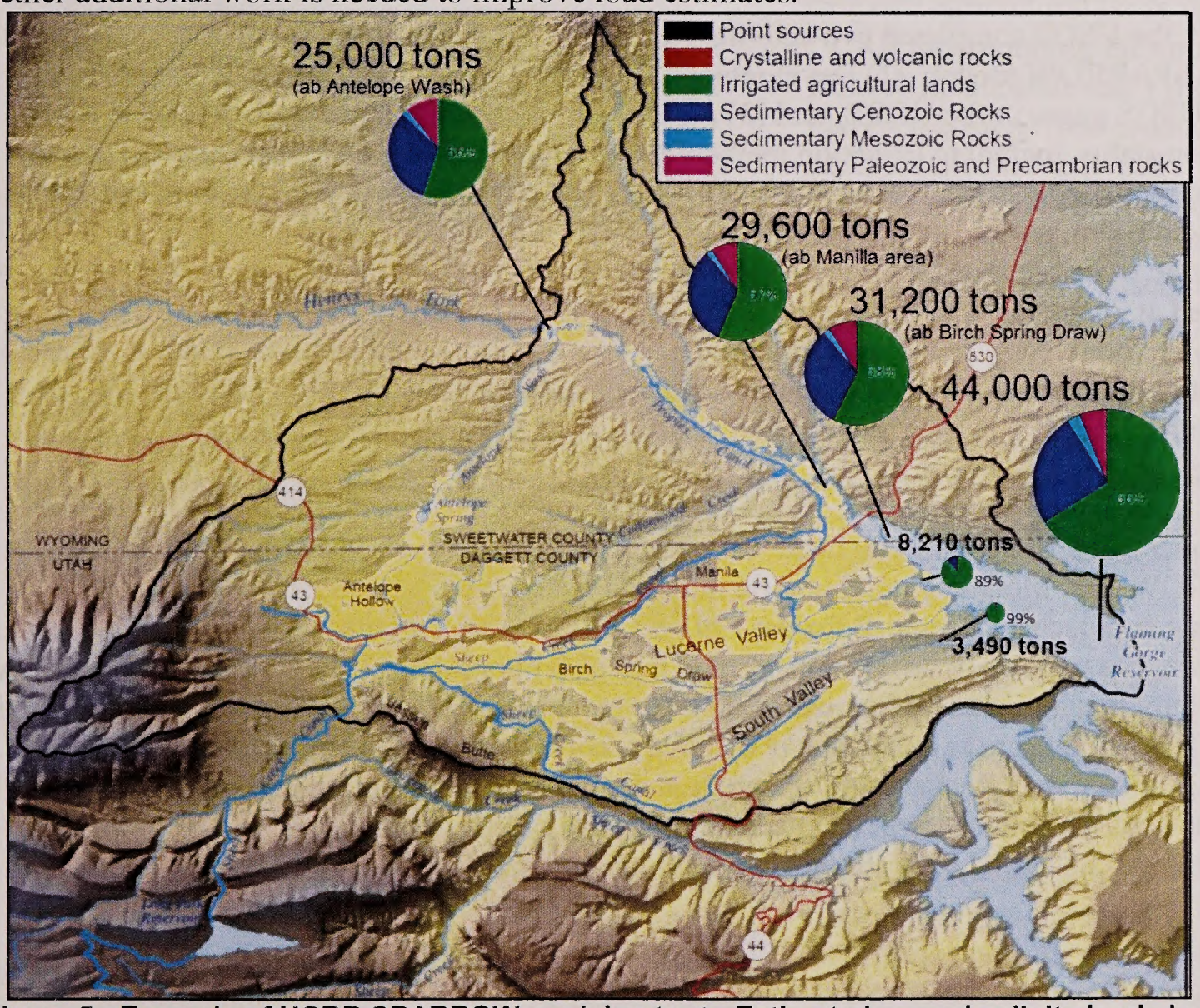


Figure 5 - Example of UCRB SPARROW model output - Estimated annual salinity loads by load source at Henry's Fork, near the Utah/Wyoming border

Because this model is receiving heavy use, program managers have been interested in enhancing the model and maximizing its utility for program assessment and management. The current UCRB SPARROW model has several significant limitations that can now be addressed to a degree by applying recently-gathered data and evolving GIS methods. Current model load estimates represent conditions in water year 1991. The year 1991 was chosen for model development and calibration, in part, due to the relative abundance of streamflow and water-chemistry data available for the UCRB for that year. Salinity control program managers, however, are frequently interested in salinity load distribution under long-term average climatic and hydrologic conditions. Salinity loads observed at monitoring sites in 1991, incorporated into the SPARROW model, were below average throughout most of the basin. Although control program managers have devised several methods to adjust 1991 model estimates to meet their needs, they are interested in revising the model to represent nearer-to-average flow and loading conditions, and to incorporate current land-use and water-use data including the effects of salinity control projects on irrigation practices. The 1991 UCRB SPARROW model is also limited in its representation of irrigated lands. Model development and calibration indicated that the presence of irrigated lands strongly correlated to downstream salinity loads. The data incorporated in the 1991 SPARROW model, however, did not differentiate among irrigation methods which can greatly affect the amount of unused irrigation water available to transport salts to streams.

In 2013, the USGS completed two activities to support the future update and enhancement of the UCRB SPARROW model: (1) Development of a new water-quality data set from a subset of active USGS gages in the UCRB, and (2) development of a geospatial model describing irrigation status, including irrigation method, in the UCRB. Water year 2013 was the last of 4 years of monitoring to augment water-quality data from existing USGS gages in the UCRB and increase the number of data sites where salinity load could be computed and used during calibration of an updated UCRB SPARROW model. In water year 2013, water-quality data were collected at 76 gaging stations in the UCRB including 38 gages in Colorado, 18 in Utah, 12 in Wyoming, 7 in New Mexico, and 1 in Arizona. The USGS has also completed development of a geospatial data set containing a spatially consistent and accurate definition of where irrigation is occurring in the UCRB and the method of irrigation. A summary of the geospatial model is provided later in this report.

In October 2013, the USGS will begin development of an updated UCRB model referred to as SPARROW 2.0. Modeling will build on the geospatial basin characteristic data sets and modeling approaches developed for the 1991 SPARROW model with emphasis on incorporating improved data to describe irrigated lands and model calibration to current observed streamflow and salinity loading rates. When completed, the model will provide estimates of salinity load in the UCRB that reflect the current level of salinity control on irrigated lands. The USGS is working closely with Reclamation scientists and engineers to maximize the SPARROW model utility toward the enhancement of future Reclamation salinity transport models, including providing estimates and predictions of agricultural and natural salinity loading to the CRSS model.

Mapping irrigated lands and irrigation type in the Upper Colorado River Basin

Irrigation in arid environments can alter the natural rate at which salts are dissolved and transported to streams. Delineating irrigated agricultural lands in the arid lands of the UCRB and differentiating between flood and sprinkler irrigated land is important to help refine existing dissolved-solids loading and transport models. Accurate maps of irrigated agriculture and irrigation practices can also help focus and prioritize salinity control efforts by more precisely identifying areas where water quality may be impacted by irrigation and agricultural practices.

Agricultural lands in the UCRB have been mapped at varying temporal and spatial resolutions UCRB states (Colorado, Utah, and Wyoming) and by Federal agencies (Bureau of Reclamation and U.S. Department of Agriculture). Most agricultural land maps include field boundaries and crop type information. The boundaries are mapped at varying spatial resolution and precision using an assortment of techniques and information sources. Colorado and Utah maps include information about irrigation type but are incomplete in some areas and the methods used to determine irrigation type varies. In addition, data in these maps are from different time periods.

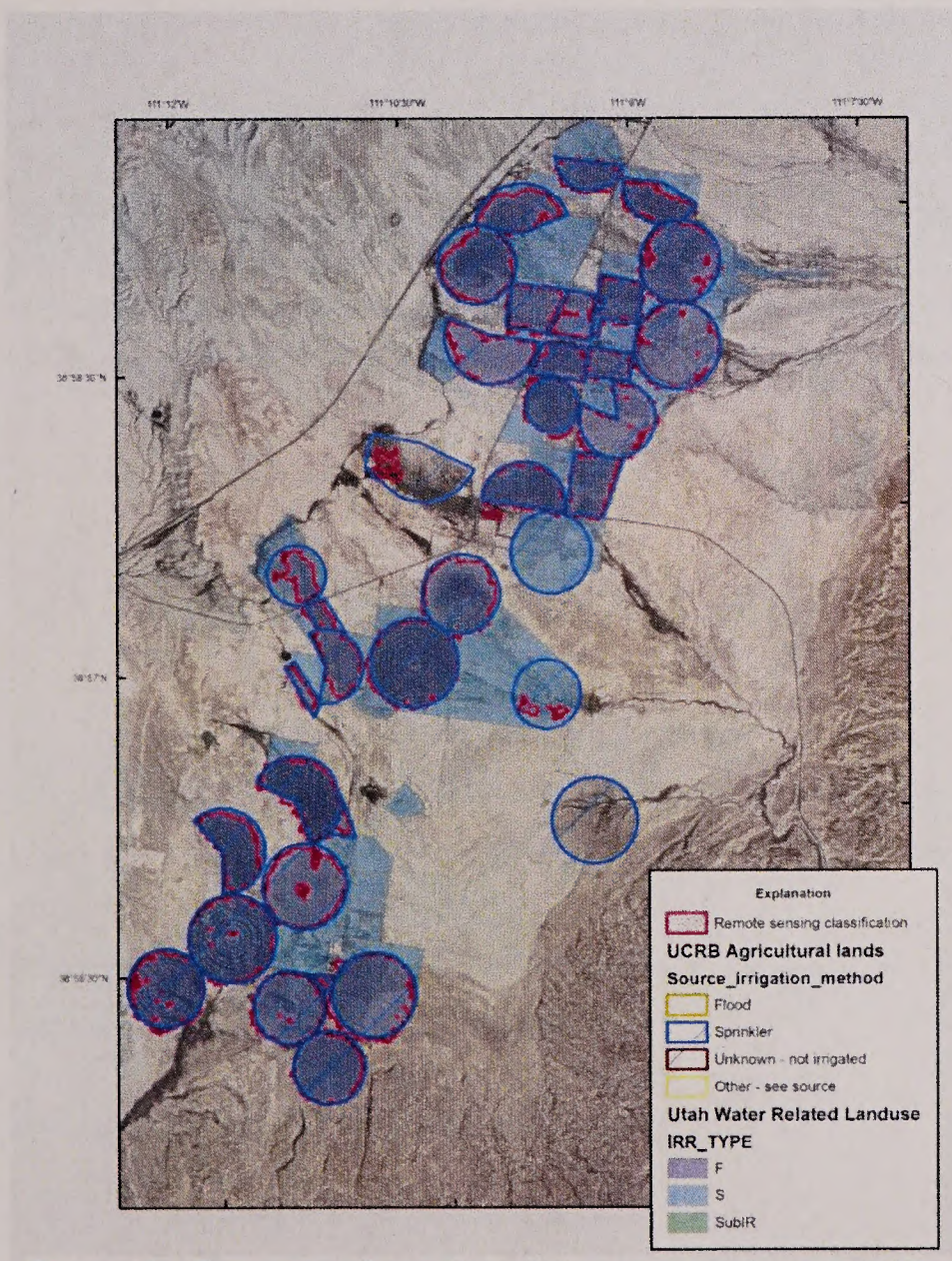


Figure 6 - Example of results of remote sensing classification to determine irrigation status, UCRB

In 2013, the USGS completed a synthesized regional map of irrigated agricultural lands in the UCRB incorporating information from available state and Federal mapping efforts. The product is a temporally and regionally consistent dataset of irrigated lands in the UCRB. The new tool can be used as a baseline dataset to monitor agricultural land use and assess irrigation practice in to the future, to improve understanding of dissolved-solids loading from irrigated lands, and to improve regional estimates of water use. Its immediate use, however, will be as a component of the updated UCRB SPARROW Model (SPARROW 2.0) for estimating salinity loads and loads sources in UCRB streams.

The mapping project was completed in two phases conducted over the course of 3 years. Phase 1 was conducted as a proof of concept and

methods development phase and was completed in 2011. During phase 1, GIS, photogrammetric, and remote sensing techniques were used in conjunction with existing datasets to map and classify agricultural parcels for a single time period in a small study area. The results of the pilot project were used to finalize techniques used to map the larger basin.

Phase 2, completed in 2013, focused on mapping the status of UCRB agricultural lands using techniques developed and refined during phase 1. Mapping is based on 2007-2010 National Agricultural Imagery Program (NAIP) data for the UCRB and on 30-meter Landsat satellite data acquired over a similar time period. The NAIP imagery is used to refine the boundaries of the existing datasets, to digitize new boundaries where necessary, and to determine irrigation type. Landsat data were used to determine irrigation status of each parcel for the period from 2007 to 2010.

The results of the mapping effort and analysis of land-use and irrigation-practice changes are documented in a USGS Scientific Investigations Report that will enter peer review in October 2013. Irrigated lands data will be published as a digital GIS dataset and released on the USGS Water Resources node of the National Spatial Data Infrastructure. Sue Buto, USGS project lead, presented the results of the study to the SCP Science Team and Work Group in September 2013.

Ranking Subbasin Salinity Loads in the Lower Gunnison River Basin

The USGS, in collaboration with Reclamation, is using the LowGunS model to define a ranking of subbasins (by tons of salinity load) in the Lower Gunnison River Basin (LGRB), which will allow for objective, informed targeting of subbasins for salinity control projects and will provide information to estimate the cost per ton of salinity removed from the system by off-farm salinity control projects.

Work has been conducted in two phases with the following tasks:

Phase I

1. Update and enhance the existing LowGunS model for use as a ranking tool
    - Incorporate improved GIS information for canal and lateral locations (GIS spatial data sets to be updated by Reclamation and not included in the funding request)
    - Incorporate improved irrigation method codes contained in the 2000 irrigated land spatial data set (irrigation codes to be provided by NRCS and Colorado River Water Conservation District)
    - Review and revise model algorithms to improve utility and accuracy at different scales
    - Update model with results of recent field work and studies
2. Rank subbasins by tons on the basis of results from the updated LowGunS model

Phase II - Augment monitoring in high-ranked basins

The results of the ranking exercise will be used to locate high priority areas (cost effective areas for salinity control as determined by Reclamation). This ranking process is especially useful for data-poor areas that otherwise would have limited justifications for priority salinity control efforts. Sampling for salinity and streamflow will be done in areas that were data poor and ranked as a high priority for salinity-control projects.

A report documenting the model updates has been completed and is scheduled to be published October 2013. A USGS report documenting the ranking study is in preparation and should be published in 2014.

Lower Gunnison River Basin Well Inventory

A recent study conducted by the USGS in the Smith Fork region of the LGRB indicates that groundwater may play a large role in salinity loading to main stem rivers. Results from the study suggest that there may be an under accounting of salinity loads in the LGRB because groundwater processes have not been properly characterized. These groundwater processes may also explain discrepancies between loading rates calculated as part of the Smith Fork region study and salinity models calibrated for the LGRB. Local irrigation entities are requesting that Reclamation further investigate this issue.

Historically, the general sampling strategy in the LGRB is to sample surface waters and arroyos that drain agricultural areas. Little to no groundwater data were collected as part of previous salinity investigations with the exception of the Reclamation well network that was established for the East Uncompahgre Valley 'water and salt budget'. There are also other sources of groundwater information that exist in the LGRB that were not originally associated with salinity investigations.

These data can largely be sourced from the USGS, the State of Colorado, and Reclamation.

In 2013, the USGS has analyzed available well data/information to improve the understanding of the groundwater system in the Smith Fork region and the contribution of groundwater to salinity loading in streams of the LGRB. Results of the assessment indicate that, in some areas, salinity load that is generated from irrigation agriculture in an incremental catchment of the Smith Fork region may be transported by groundwater to a significant distance downstream of the irrigated-lands source area before returning the stream system. Results of the stud will be presented to UCRBSCF Workgroup and Science Team in the fall of 2013.

Analysis and Preservation of Historic NRCS Monitoring and Evaluation Work in the Grand Valley and Other Areas of Western Colorado (1985-2002)

The NRCS assessed deep percolation and estimated salt loading derived from irrigated agricultural lands in the Grand Valley in a 1985 to 2002 monitoring and evaluation study, hereafter referred to as "NRCS M&E". That assessment provided a baseline of deep percolation

characteristics on agricultural land, and has been used by NRCS to make management decisions related to salinity reduction projects.

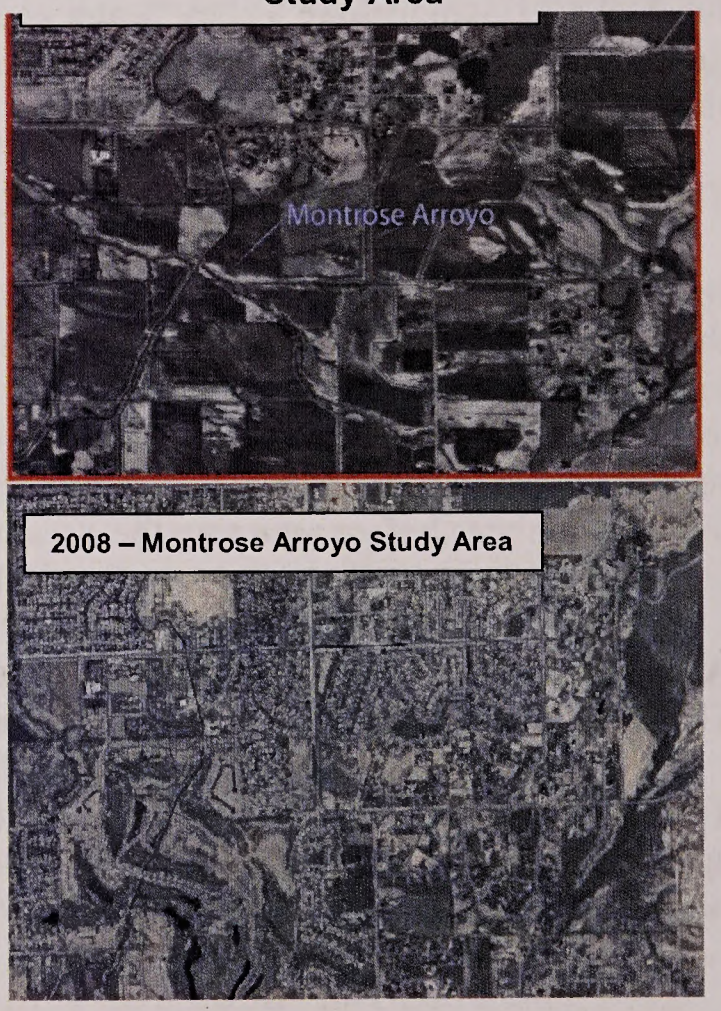
The NRCS M&E data have never been made public. The data were released internally to the NRCS in a series of annual reports from 1985 to 2003. In 2012 and 2013, the USGS worked with the NRCS to characterize NRCS M&E and evaluate the data set, along with documenting the methods utilized in collecting the data. A regression analysis was also completed to examine the M&E data with regards to using site parameters to predict irrigation efficiency and deep percolation of irrigation water.

The USGS presented the results of the study to the SCP Science Team and Work Group in 2013 and has completed a report documenting the effort that is currently in peer review. The report is scheduled to be published 2014.

Effects of Urbanization on Salinity and Selenium Loading in Montrose Arroyo, Western Colorado

Since 1993, an estimated 75 percent of agricultural lands have transitioned to urban land in the lower portion of the Montrose Arroyo subbasin, with most of the transition occurring after 2000. A previous USGS study documented, on a site-specific basis, a decrease in water use and deep percolation associated with the conversion of agricultural lands to urban land use. This project has revisited Montrose Arroyo to determine, on a watershed level, the effects of urbanization on salinity loading. The Montrose Arroyo study has assessed the integrated effects of multiple types of land-use change, including the conversion of previously unirrigated land to residential use on salinity and selenium loading to area streams. The study was designed to produce information that could be used to help understand what the future effects of residential growth will be on salinity levels in the Uncompahgre Valley.

Figure 7 - 1993 and 2008 Montrose Arroyo Study Area



Specific activities included:

- Collecting bi-monthly (six samples per year) water-quality data through two irrigation water years (April 2008 through March 2010) at the three sites on Montrose Arroyo sampled in previous studies

- Quantifying areas of urban development that have occurred since 2000 using GIS data and data from other sources

- Estimating changes in salinity loading (trends upward or downward) using instream data and compare to historical instream data

Data collection was completed for this study in March 2010 and a USGS Scientific Investigations Report documenting the effort was published in 2011 (The report is available at http://pubs.usgs.gov/sir/2011/5106/).

Data presented in the report indicate there was little to no change in salinity levels in Montrose Arroyo prior to and after residential development. Based on these results, it was proposed that additional sampling near other possible salinity load sources including an 18-hole golf course be conducted to determine if that area, or other sources, may be offsetting any decreases that might have occurred as a result of residential development.

Beginning in October of 2012, a second phase of the Montrose Arroyo study was initiated including sample collection at the previous study monitoring sites and at one additional site. The new site has historical data for use in comparing pre - and post-land conversion water-quality conditions in the middle section of the Montrose Arroyo study reach. Data collection for phase II will be completed in 2013 and a USGS series report documenting the study effort will be published mid-year in 2014.

Investigation of Transport of Dissolved Solids Discharged from Pah Tempe (La Verkin) Springs, Southern Utah, and possible remediation of salinity load to the Virgin River

Pah Tempe Springs discharge substantial amounts of dissolved solids (salt) to the Virgin River, which are transported downstream and contribute to the salinity of the Colorado River. Consequently, these salts affect the suitability of water in the LCRB for agricultural, industrial, and domestic uses. Studies conducted in the 1970s and 80s determined that desalinization of the water discharged from Pah Tempe Springs is technically feasible. However, the reduction in dissolved solids that would have been realized in the Colorado River from this type of project was less economical, at the time, than other proposed projects and involved several uncertainties. Consequently, the project was not implemented.

Figure 8 - Pah Tempe Spring, Washington County, Utah

During 2007-08, the USGS in collaboration with the SCP conducted a preliminary assessment of the transport of dissolved solids from Pah Tempe Springs downstream to below Littlefield. This first-phase study was conducted to provide managers with information needed to determine if they should proceed with a more rigorous and comprehensive assessment of the Pah Tempe Springs salinity load and the development and consideration of possible remediation scenarios. Results of the Phase-I investigation, which utilized longer data record periods than the previous studies, indicated that flow and salinity loads in the Virgin River Basin were substantially different during 1992-2006 than those reported for the period prior to 1971 and concluded that removal of salts discharged from Pah Tempe Springs could result in a larger reduction in dissolved-solids loads in the river at Littlefield, Arizona, than was previously estimated by Reclamation.

Based on these results, Program managers determined to move forward with a comprehensive investigation. The scope of work for this second phase was defined by recommendations resulting from Phase I and included the following tasks:

1. Determine the sources of groundwater discharged from Littlefield Springs and the approximate age of this spring discharge.
2. Determine the current discharge and dissolved-solids concentration in water from Pah Tempe Springs and identifying seasonal variations in these parameters.
3. Acquire additional data for calibrating Virgin River dissolved-solids load models, particularly in the lower Virgin River Basin (that portion of the basin downstream of the Virgin River Gorge).
4. Determine if salt reduction in the Virgin River associated with the removal of salts discharged by Pah Tempe Springs will affect the dissolution of salts in soil and rock in downstream agricultural areas or in the aquifer upgradient of Littlefield Springs.
5. Determine the amount and variation of seepage occurring in the Virgin River reach between Bloomington, Utah, and the USGS streamflow gage above the Narrows in the Virgin River Gorge.

Key results of the phase II study (considered preliminary as the report has been through peer review but has not yet been published) generally confirmed the results from Phase I relative to tasks 2, 3, and 5 above. Phase II results also indicated that a significant portion of the discharge from Littlefield Springs comes from Virgin River seepage to groundwater and has an apparent travel time from losing reaches of the river to the springs of less than 30 years. The preliminary results imply that a hypothetical reduction in dissolved-solids load in the Virgin River below Littlefield Springs, if Pah Tempe Springs salts were restricted, may be from about 67,000 or 71,000 ton/yr. immediately and as high as 90,000 ton/year within 30 years of restriction. A USGS report documenting Phase II has completed peer review and will be published by December 2013.

The USGS, in cooperation with Reclamation and the Washington County Water Conservancy District is now working on two study tasks as part of a third study phase (Phase III) beginning to explore the feasibility of Pah Tempe Springs load mitigation scenarios and the effects of mitigation on downstream Virgin River flow, chemistry, and ecology.

One potential approach to reducing the Pah Tempe Springs salinity load to the Virgin River would include the pumping of thermal water from within the Hurricane Fault damage zone to lower the groundwater pressure head at spring discharge locations and reduce or eliminate discharge from the springs to the river. The CRBSCF, Reclamation, and local water managers would like to know if this approach is a feasible solution, what level of groundwater withdrawals might be needed to capture a large percentage of saline spring discharge to the river, and what would be the effect of the tested range of withdrawal rates on the quality of the extracted water and on streamflow conditions below the springs in general.

To meet these information needs, the USGS has designed experiments to assess the effects of groundwater withdrawal from the Hurricane Fault zone on discharge of saline water from Pah

Tempe Springs, and on the flow and quality of water in the receiving Virgin River. Tests are currently scheduled for November and December 2013 and will include the following tasks:

1. Monitor changes in spring and pumping well discharge, chemistry, and temperature over time and under different pumping and streamflow conditions.
2. Monitor changes in streamflow and stream water chemistry within the reach of the river where springs discharge directly to the river.
3. Monitor temperature continuously at the study-reach streambed and use heat as a tracer for spring discharge.

Study results will aid in understanding the general hydraulic characteristics and properties of the study area fault zone and will allow for assessment of the feasibility and effectiveness of a range of possible pumping scenarios to reduce salinity load to the river. This will allow Reclamation and CRBSCP managers to assess the scope and cost of Pah Tempe Springs salt load mitigation approaches that incorporate groundwater pump-and-treat techniques.

Figure 9 - Example of the fiber optic cable that will be used as a linear sensor of temperature and the occurrence of Pah Tempe spring discharge in the Virgin River stream bed.

The USGS has also begun to evaluate available information and tools to assess the effects of treating water discharged from Pah Tempe springs to the Virgin River on the distribution of native fish. The Virgin River is home to six native fish species. Two of these species, the woundfin (*Plagopterus argentissimus*) and the Virgin River chub (*Gila seminude*), are federally listed as endangered species. The Virgin spinedace (*Lepidomeda mollispinis*), while not federally listed, was proposed for listing as an endangered species in 1994. As with all organisms, the ability of the native fish of the Virgin River to survive in a given area is dependent on the physical, chemical, and biologic conditions in the river.

Pah Tempe springs is a significant source of hot, salty, low oxygen water to the Virgin River that influences the habitat conditions for native fish species below the springs. While many studies have quantified the abundance, distribution, and habitat requirements of native fish species in the Virgin River, the direct links between changing water quantity/quality conditions and native fish survival in the Virgin River are less clear. Ideally, Salinity Control Program managers charged with assessing the feasibility of mitigating Pah Tempe Springs salinity load and the effects of mitigation on Virgin River ecology would be able to quantitatively predict how future changes in water quantity and quality conditions in the river will influence native fish survival. The USGS have taken the initial steps to answering the overarching question, "How will various remediation scenarios to reduce the load of dissolved solids from Pah Tempe springs into the Virgin River influence the distribution and abundance of native fish?"

In 2013, the USGS conducted a literature search and data review, and compiled existing water quantity and quality data that are anticipated to change as a result of Pah Tempe springs

mitigation scenarios, and that are known to influence native fish survival (i.e. discharge, temperature, dissolved oxygen, turbidity). Similarly, existing data on the abundance and distribution of native fish in the river has been compiled. The review pulls from the extensive work that has already been done on native fish abundance and distribution or water quality conditions as part of the Virgin River Resource Management and Recovery Program and reported in publications by Utah State University, the Utah Division of Wildlife Resources, the US Fish and Wildlife Service, the US Environmental Protection Agency, and from the Virgin River Fishes Database. This compilation can provide a baseline set of data that will allow for investigation into the cause and effect results of different management scenarios. A USGS Open File Report summarizing the compiled fish abundance/distribution and water quality data is currently in review and should be published by January 2014.

Monitoring Salt Loads Discharged from the Manila-Washam Salinity Control Project Area, Utah

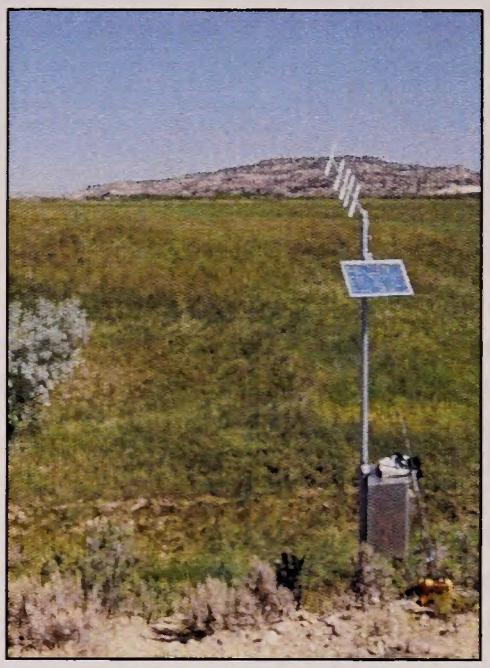


Figure 10 - U.S. Geological Survey water quality monitoring site in Birch Springs Draw, Utah

During 2004-05, the USGS investigated the occurrence and distribution of dissolved solids in water from the agricultural lands near Manila, Utah, determined the amount of dissolved solids being discharged to Flaming Gorge Reservoir, and subsequently reported the results in a Scientific Investigations Report (Gerner and others, 2006; available at http://pubs.usgs.gov/sir/2006/5211/PDF/SIR2006_5211.pdf .

The NRCS began implementing a salt-load reduction project in the Manila-Washam area during 2007 that involved converting flood irrigation to gravity-pressure sprinkler irrigation systems. As part of the project implementation, and in support of future projects, the USGS has monitored the concentration of dissolved solids in selected drains and seeps to observe changes that occur during implementation of the Manila-Washam Salinity Control Project (MWSCP).

The largest discharge of dissolved solids from the MWSCP area is from Birch Springs Draw (BSD). Consequently, a streamgage (USGS site 09230300) was installed near the outflow of BSD in May 2007. Discharge, specific conductance, and the water temperature of BSD streamflow were continuously monitored through water year 2012. Frequent water-quality samples have been collected from BSD to define the relation between dissolved-solids concentration and specific conductance. Discharge and specific conductance or dissolved-solids concentration have been measured periodically at other major drains and seeps discharging directly to Flaming Gorge Reservoir from the MWSCP area. These continuous and periodic data sets were used to determine the net annual load of dissolved solids discharged from the entire MWSCP area through water year 2012.

Completion of the NRCS salt-load reduction project in the Manila-Washam area has progressed at a slower pace than originally expected. As a result, the SCP Science Team recommended discontinuing the full monitoring plan in the area and annual computation of salinity load discharging from the area to Flaming Gorge Reservoir. Per the team's recommendations, data will

continue to be collected at the BSD, but operation of the gage will shift to the NRCS. All flow measurements and water-quality sampling in others parts of the study area will cease for a period. The SCP Science Team plans to review options for future monitoring to continue to assess the effects of the MWSCP as it proceeds to completion, including possibly collecting data and estimating salinity loads every 3 years instead of annually. The USGS is summarizing the monitoring effort and computed trends in salinity load out of the basin for the monitoring period in a technical report.

Bureau of Land Management (BLM)
Colorado River Basin Salinity Control Program
Accomplishments for Fiscal Year 2013

The BLM is dedicated to its responsibility in identifying and reducing salt mobilization and transport. As required by amendments to the Colorado River Basin Salinity Control Act of 1974, the mission mandates under the Federal Land Management Policy Act of 1976 (FLPMA) that the BLM is committed to reducing salinity concentrations in the Colorado River as contributed from its public lands. The BLM has multiple programs that contribute toward salinity reduction and total dissolved solid (TDS) transport reduction, especially in the 53 million acres of public lands above Yuma, Arizona. This area that falls within the Colorado River Basin (CRB) is classified as arid or semi-arid rangeland. The salts on these lands can be from Point (springs, seeps, wells, and oil and gas production) and Nonpoint sources of salt (erosion and runoff that reaches water bodies).

Within the Colorado River Basin, the erosion of marine sediments into shales lend themselves to concentrated areas of salt because of the minimal annual precipitation (<8 inches). When a high intensity storm occurs creating runoff, the salts are readily available on the surface to be transported vertically or horizontally depending on the amount of clay and the compactness of the ground. It is estimated that approximately one-third of the annual salt load from BLM public lands is received by runoff from highly saline soils in the upper CRB.

The BLM programs that have been identified as contributing data and information that we have only begun to obtain include: Soil, Water, and Air (SWA); Recreation; Rangeland; Acid Mine Land; Riparian; Wild Horse and Burro Management; Fire and Revegetation Emergency Stabilization Recovery; Renewable Energy; Fluid Mineral; Hazardous Fuels Reduction; and Forest and Wetlands. Coordinating with these programs, collecting data, documentation, and organizing the information is a long-term endeavor but it is the beginning of a quest to address the common question: "How does the BLM quantify its contribution toward salinity reduction?" The answer today is: In many ways. Hopefully the answer in the future will be more quantitative, more inclusive of the programs mentioned above as Salinity under Soil, Water, and Air is only a fraction of BLM's support toward TDS and salinity movement restriction into nearby water bodies. With time we expect decreasing error bounds as well.

These impactful programs may document an increase or a decrease in TDS and salinity depending on the action being performed. Off-road vehicles, removing tamarisk, redesigning streambanks to ensure native species populations are thriving over invasive species, establishing rights-of-ways, thinning forests, expansion of the urban interface, and grazed and unmanaged lands are examples of the breadth of issues that BLM covers which impact the Colorado River Basin Salinity Control accounting of salinity.

Because the BLM manages public lands under a multiple-use mandate per FLPMA, many land-use activities that impact salinity/sediment reduction and/or to retain land health standards are already utilizing best management practices. Many ground efforts, such as grade-control structures, spreader dikes, retention structures, stabilization and rehabilitation efforts are conducted but many are not quantified, i.e. final product – baseline measurement either because

it does not apply to the project, no baseline was able to be taken nor anticipated, monies were applied toward another project rather than following up on the previous project. As an agency, we aim to integrate more qualitative efforts in the future.

The BLM has established and continues to improve upon its policies and practices to maintain and restore land-health based on key standards reflecting vegetation (erosion, conservation-sediment retained), ecological attributes, watershed function, and biotic integrity. So far the Land Health Standards have 90 standards that relate to assessing sediment retention/erosion.

Within the CRB, the number of BLM rangelands that are meeting all Rangeland Health Standards, including units of sediment retention per acre, as inventoried and reported last in 2012 http://www.blm.gov/wo/st/en/prog/more/rangeland_management/rangeland_inventory.print.html are in the table below.

Table 4 - BLM Acres meeting Rangeland Health Standards as of 2012 Inventory

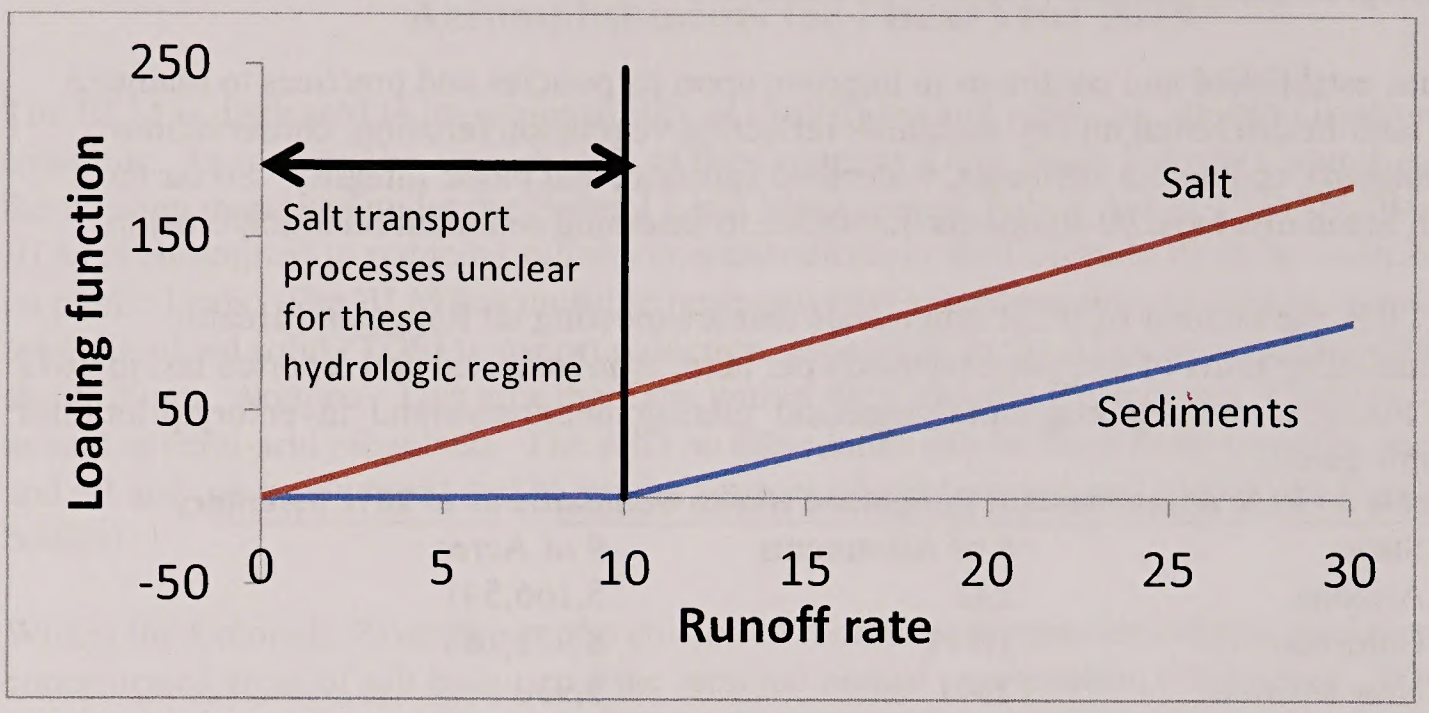
State	# of Allotments	# of Acres
Arizona	232	5,166,541
Colorado	1,711	8,973,164
New Mexico	254	9,930
Utah	950	15,241,974
Wyoming	600	11,182,453

Total BLM Acres Meeting LHS within CRB 40,574,062 acres

A new approach to establishing a baseline from which to move forward was funded by BLM in December, 2012. Due to the lapsed labor funds from the vacant Salinity Coordinator position, BLM invested $100,000 in a joint USDA ARS-USDOI BLM project to conduct a study to improve the current understanding and identify the gaps in knowledge regarding the sources and transport mechanisms in rangeland catchments that deliver TDS to streams. A literature review ensued that resulted in reviewing approximately 1200 worldwide reference items. Synthesis conclusions are being drafted into a chapter-based synthesis that attempts to relate how certain management practices or land conditions affect dissolved solids yields to streams. The study was focused on non-irrigated lands in semi-arid and arid domestic and international rangelands. To ensure the best product possible the Water Quality Information Center at the National Agricultural Library (NAL) substantially assisted a core team of reference item evaluators in creating a search list criteria and updating the bibliography as needed and in the final production of its synthesis and production. The BLM, Reclamation, and NRCS management practices were included in the search for their relationship to salinity reduction. Only items that were electronic could be included.

Thus far, the findings have demonstrated that: (1) TDS is a good surrogate of salinity (Figure 1); (2) It is generally accepted that practices that reduce soil erosion and sediment transport might also reduce salt loading; (3) little literature exists on the relationship between rangeland management practices and runoff or sediment; (4) limited literature found on direct impact of land management practices (i.e., gully plugs, contour farming, chaining); (5) Currently relationship on salt- management practices inferred from assumed impact of practice on runoff and sediment loading (partly because of lack of supporting data) through changes in vegetation type and distribution, canopy and ground cover, and soil surface/hydraulic roughness; and, (6) Literature indicates that all practices that were evaluated for reducing salt loading have a

defined lifespan and must be maintained (sediment removed from gully plug) or redone to be effective (contour furrow).



It has been assumed there is a hypothetical linear relationship between runoff and salt /sediments. This relationship needs to be quantified for various dominant Ecological Sites due to inherent different in salts in the soils across the basin and will change as a function of vegetation type, density, and canopy and ground cover (i.e. management).

Program Summary and Administration

The BLM established a Salinity Coordinator position in 2003 and vacant for most of FY2012, was filled by Dr. Colleen (Cole) Green Rossi. However, organizational changes to the Salinity Coordinator position include: (1) Transferring administrative responsibility from the Washington Office (WO) to the National Operations Center (NOC), and; (2) combing job duties with a national water quality specialist position. The administrative changes were made in response to a BLM-wide effort to reduce the number of remotely assigned positions reporting to WO and improve the effectiveness and efficiency of services provided. While travel funds are available they are neither part of the Salinity funds nor part of the funds associated with Dr. Rossi's position. The sequestration may impact Dr. Rossi's and BLM's WO managers' abilities to participate in meetings. Challenges will exist in meeting all of the expectations of the combined position and Dr. Rossi and the BLM will continue to work according to priorities established by both positions and the Department of the Interior's needs.

In review, the BLM expends millions of dollars annually through multiple subactivities, i.e. watershed management, restoration, and mitigation activities to contribute to salinity reduction in the CRB. The BLM is not able to effectively report quantitative reductions due to previous agency approaches; however, with the hiring of Dr. Rossi, she is working on an approach in which to quantify future project findings and measurements as applicable.

STATE REPORTS

For FY2013, $750,000 was allocated for BLM's salinity-control program from its SWA subactivity to support projects that met the criteria Chief Boyd determined to be eligible for salinity control program objectives in the Upper Basin State Offices. Project funding is allocated toward proposals submitted by State Offices (AZ, CA, CO, NM, UT, WY) through the BLM Budget Planning System and prioritized for the WO SWA Program Lead with input from the Salinity Coordinator. Funding is distributed between planning, research, and field implementation projects according to need and availability of personnel to successfully accomplish project.

Arizona: received $70,000 (9.4% of salinity funds)
No projects occurred on the ground. No data for work occurring within the Colorado River Basin has been provided. Aaron Wilkerson, SWA State Lead began in March, 2013 and communicates regularly with Drs. Larisa Ford and Cole Rossi. The Hydrologist started after Aaron.

Table 5 - Salinity project funding and units.

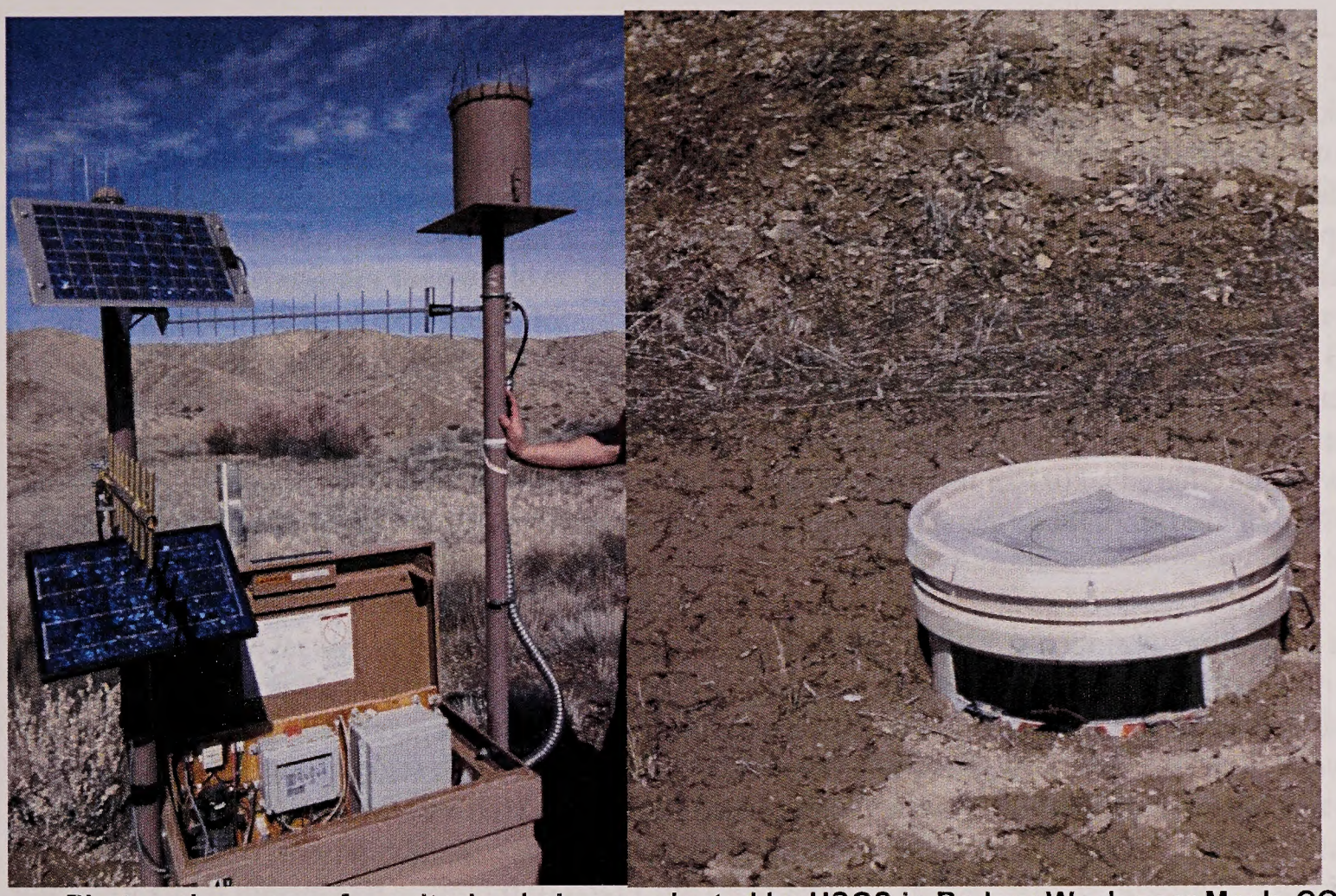
Office	Project Name	BPS #	Amount
LLCONO5000 White River	Piceance Salinity Dynamics Study	50154	$50,000
LLCONO3000 Grand Junction	Coal Mine Impact Study Phase 2	54810	$25,000 total: $15,000 to USGS and $10,000 to FO
LLCONO3000 Grand Junction	Vegetation and Soil Crusts Salinity Program Study	58265	$30,000 total: $25,000 to USGS and $5,000 to FO.
LLCOSO1000 Tres Rios FO	Salinity Basin Restoration	53652	$5,000
LLCOSO5000 Uncompahgre	Mancos Shale Oil	62672	$35,000
LLCOSO54000 Gunnison Gorge NCA	NLCS-GGCA-Salinity Rd. Rehab.	62688	$45,000
LLCOSO7000 Canyons of the Ancients NCA	NLCS-NM/NCA CANM Soil Stability	61975	$20,000

Colorado: received $210,000 (28% of salinity funds)

Grand Junction Field Office: Salinity Funding for two projects (POC is Nate Dieterich, hydrologist – Grand Junction FO)

1a. Badger Wash Study with USGS
The Badger Wash study area in western Colorado provides a unique opportunity to assess contributions of domestic grazing on Mancos Shale to in-stream salinity. The study area has four paired grazed/un-grazed watersheds ranging from 5 to 40 ha in size that were established in the early 1960s. Badger Wash was the focus of intensive study in the 1960s and 1970s and results from those early studies indicate grazing greatly increases both sediment production and run-off from Mancos Shale.

To evaluate whether the observed differences in run-off and erosion have persisted, the USGS and BLM re-instrumented the ponds that were built at the bottom (to collect runoff and sediment) of the watersheds in 2006. However, due to changes in flow regimes and sedimentation of the ponds, very few flow events have reached the ponds during the six years of monitoring. As an alternative approach, the USGS has been monitoring hill-slope erosion using silt fences since 2008 and analyses of cumulative sediment production conducted through 2012 indicate grazing treatments differences are persisting but vary with topography. In 2012, the USGS initiated an expanded silt fence effort to confirm initial results, to further understand the effects of topography, and to isolate the effects of historic versus current grazing activity. This silt fence effort includes the installation of 60 new fences distributed across soils and topographic settings. In the grazed watersheds, cattle will be excluded from half of the silt-fence watershed. Additionally, in 2012 the USGS has initiated efforts to monitor run-off in one sub-watershed in each larger experimental watershed. Silt fence locations and new weir locations have been selected and archeological clearances obtained with installation expected in October 2013 (see pictures below).



Photos above are of monitoring being conducted by USGS in Badger Wash near Mack, CO

1b. Coal Mine Impact Study

Coal mining in the Book Cliff area north of Fruita, CO is currently idle. The GJFO continued monitoring within the Book Cliff Study area (streamflow and field water quality parameters) at 10 established sites. Due to budget concerns, the NW district would not allow any BPS funds spent; therefore, seasonals were not hired. This year was also affected by drought as all but one of the established sites was dry from April-July (and likely to September). The BLM also collected monthly precipitation and established 3 groundwater monitoring wells in the study area.

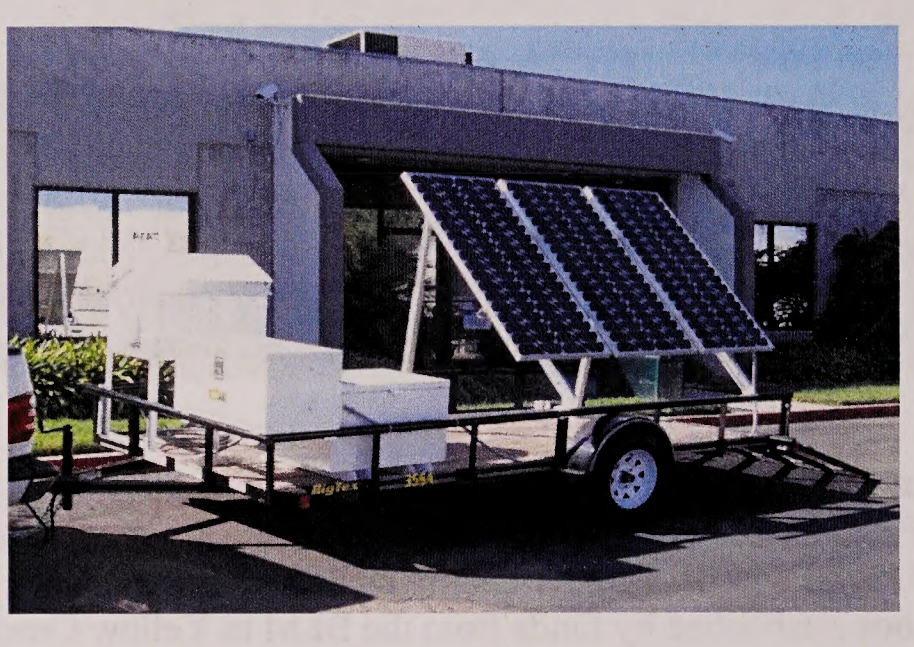
2. Piceance basin work

Salinity funding for FY2013 for the White River Field office will support ongoing United States Geological Service (USGS) and BLM water quality monitoring on Piceance and Yellow Creek. The conductivity probes established by funds from the BLM in Yellow Creek above the White River and Piceance Creek above the White River will be fully funded for water year 2014. Costs are about 18k of annual maintenance for each probe, for a total of 36k. The additional 4k will go to lengthen the record of conductivity probes that will be discontinued or will support other water quality sampling in the basin. Three conductivity probes, two on the White River and one on Piceance Creek at Ryan gulch that have been supported by BLM in the past, but will have to be discontinued starting in October 2013 due to budget cuts. Some of the reasons why the Yellow Creek and Piceance conductivity probes are priority are; that they have recently been improved by the application of small pumps that reduce fouling and improve data collection, these two sites they have the shortest record, and these sites are in key locations below BLM permitted activities.

Base funding has been used to sample Stinking Water Creek with Chevron and the USGS. Stinking Water Creek is the main drainage below a historical oil field development by Rangely, Colorado. The development called the Weber Sand Unit is almost at 10 acre spacing for production and injection wells in an area dominated by Mancos Shale and saline soils. Passive samplers and precipitation tipping bucket rain gauges have been installed in Stinking Water Creek and samples analyzed by BLM after runoff events. Also, Chevron based on a BLM-Chevron Memorandum of Understanding has funded 20k for USGS water quality sampling in 2013 and 2014 to evaluate this watershed's contribution to salinity and selenium in the White River. Two sampling trips have been completed with more to occur in 2014. Complete summary of past work can be found at - http://teamspace.blm.doi.net/sites-id/swashare/Shared%20Documents/Forms/AllItems.aspx?RootFolder=%2Fsites%2Did%2Fswashare%2FShared%20Documents%2FColorado%2FWater%20Quality%20data%20call%2FWRFO

Dust Sampling continues at Little Snake FO and Grand Junction FO:

BLM Colorado initiated, and is currently operating two dust samplers, and signed an MOU with University of Colorado at Boulder to analyze the chemical constituents of the dust samplers. The dust samplers are located in Craig and Grand Junction, CO. There's a concern in the SW US about the effects of dust events on the albedo of snowpack, associated changes in runoff and erosion.



3. Uncompahgre Field Office – Montrose:

There were two salinity BPS projects slated for our office, LXSICWSA0000 67672 and LXSICWSA0000 62688, and funding for both projects were utilized to offset sequestration impacts.

Salinity work accomplished as part of base includes 2 monitoring projects.

- Relief Ditch – Monthly monitoring of 5 groundwater wells to characterize the groundwater/surface water interface and influence of salinity on vegetation. This is baseline monitoring prior to a large riparian vegetation treatment on the floodplain of the

Gunnison River. The project is anticipated to be funded with salinity money from the Reclamation replacement acreage.

- Nicolas Property – Continued conductivity monitoring on the BLM's acquired water right. Monitoring is necessary to characterize the salinity increase in the water as it flows through BLM. A change in point of diversion for this water right would prevent the increase in salinity but would require the water be diverted through National Park Service. NPS has requested additional water quality monitoring to ensure the change in point of diversion is necessary.

New Mexico: received $100,000 (13.3% of salinity funds)

As you probably already know, the 2013 funding was just recently released to me. I have about 120 acres of mow and drill projects in decadent sagebrush habitat to reduce erosion into the San Juan River that is scheduled to start the week of July 22. I also have about 400 acres of drill only projects to reduce runoff in Simon Canyon - a tributary to the quality waters section of the San Juan River that is scheduled to start in September. To Date, I have completed 5 polygons on pinyon/juniper (pj) seed, cut, lop, and spread. The pj projects are located in areas that have deep soils that were sagebrush/grassland habitat years ago that have been invaded by pj. These habitats have virtually no understory and result in high rates of erosion. The polygons are seeded before cutting so the foot action of the project works the seed into the ground. The slash is cut into very small pieces and scattered to cover the most amount of bare soil as possible. This is the third year of doing this type of project, and we have seen good grass and forb germination under the slash and an obvious - although not measured - reduction in erosion. The 5 polygons are about 2.5 acres in size for a total of about 12.5 acres. I have attached two photos of the pj project; please note the lack of understory vegetation in the photos.

As of July 8:
BPS#56434 Camel Tracks Road Rehab project, and a site map showing proximity to the Santa Fe River. **Link**, here are photos of the project before and after. The attached map shows the phases. In 2011, we matched phase I funding with NM National Guard who purchased the gravel and Santa Fe County who purchased the fencing. We are in the works with the Guard now for part of Phase II gravel supply, of which they have purchased $42,000 of gravel this year.

The old road was nothing more than a two-track braided road that was anywhere from 16' wide to 150' wide. The general alignment followed the famed Route 66, and other historic trails but the road path had fallen to ruin so drivers were using the side girth to make their way however possible. This road is access to a popular shooting area, grazing pastures, access to Forest Service to the south and ultimately to the old La Bajada road on the South end of the mesa.

By defining and grading the road, BLM sought to minimize surface disturbance all the while moving the alignment away from the historic roads and trails and ultimately helping to reduce surface runnoff to the nearby Santa Fe River and subsequently the Rio Grande.

The first Phase included developing a culvert crossing across the large arroyo and installation of the cattleguard at the end of phase I, and fence installation on the East edge of the road to limit

off road travel and illegal dumping.

As can be seen the project was multifaceted by solving many of the resource concerns and working with the local partners to achieve the end product. I look forward to continued efforts with the Guard and Santa Fe County.

Stream Gauge Data

Red River below fish hatchery, near Questa, NM
http://waterdata.usgs.gov/nm/nwis/nwisman/?site_no=08266820&agency_cd=USGS

Rio Puerco above Arroyo Chico near Guadalupe, NM
http://waterdata.usgs.gov/nm/nwis/nwisman/?site_no=08334000&agency_cd=USGS

Arroyo Chico near Guadalupe, NM
http://waterdata.usgs.gov/nm/nwis/nwisman/?site_no=08340500&agency_cd=USGS

Pecos River north boundary (BLM wetlands) near Dexter, NM
http://waterdata.usgs.gov/nm/nwis/nwisman/?site_no=08394024&agency_cd=USGS

Pecos River south boundary (BLM wetlands) near Dexter, NM
http://waterdata.usgs.gov/nm/nwis/nwisman/?site_no=08394033&agency_cd=USGS

These pictures are to document achievements on the Camel Tracks Road Rehab project, BPS #56434. I will send 3 more in addition to these, of which all are 'before' shots except the last one of the attached, which is an 'after' shot.

The below site has data and information for BPS #54133 'Air Quality Task Force' to supplement the running success story that the Farmington guys have been diligent in providing.
http://www.nmenv.state.nm.us/aqb/4C/index.html

Utah: received $240,000 (32% of salinity fund)

Project Id	Project Name	Funding Amount	Comment
50238	ONGOING GRAZING EXCLOSURES	$30,000	Requested Amount
63342	PARIETTE MINEROLOGY CONTROLS	$40,000	Requested Amount
59553	NLCS GSENM SALINITY CONTROL	$85,000	
39419	PARIETTE WETLANDS SALINITY PRJ	$155,000	Partially funded, original request was for $125K.
63223	FENCING FOR SALINE REDUCTION	$5,000	Money for completion of monitoring, effectiveness assessment, and summary report of previous Riparian Exclosure work for Salinity reduction. Original request was for $29,700 to complete additional exclosures.
59002	NINE MILE W/S ENHANCEMENT	$0	Initially funded, PFO unable to complete, so re-allocated midyear to GSENM Salinity Control (above)
55750	NINE MILE CREEK RESTORATION	$0	Initially funded, PFO unable to complete, so re-allocated midyear to GSENM Salinity Control (above)
63138	PRICE RIVER ENHANCEMENT	$0	Not funded
Total		$240,000	

PARIETTE WETLANDS

Pariette Wetlands is an oasis in the Uinta Basin and was developed in 1972 to improve waterfowl production and provide seasonal habitat for other wildlife species. It encompasses 9,033 acres, 2,529 of which are classified wetlands or riparian and is the largest BLM wetland development in Utah. The wetland contains diverse vegetation and wildlife in an arid climate.

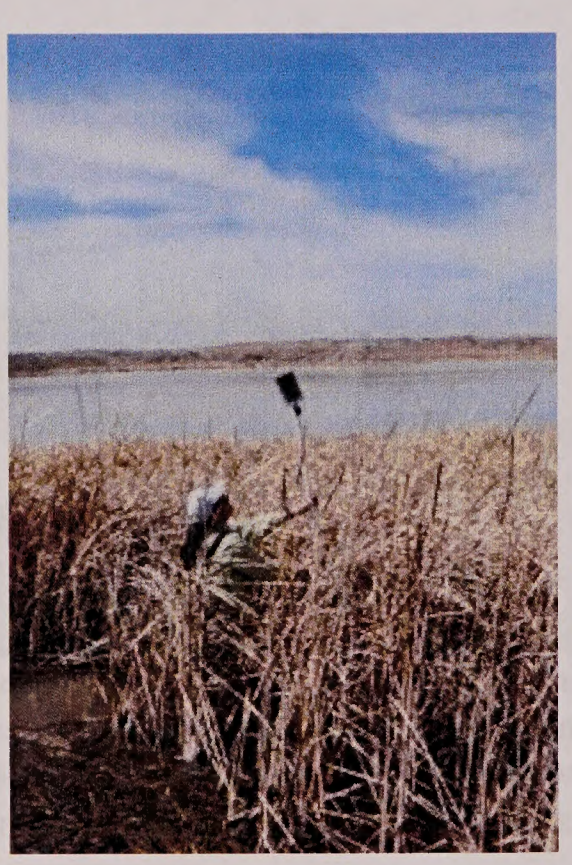
ONGOING STUDIES

Pariette Wetlands Salinity/Selenium

The purpose of this project is to replicate a study conducted in the 80's and 90's in the Big Wash, Castle Peak, and Pariette drainages and more specifically Pariette Wetlands to evaluate whether water quality contaminate levels have increased, decreased or remain the same. Furthermore the study should help provide a baseline to help determine how certain elements such as Se are partitioned between plants, water, sediments, and representative aquatic animal or waterfowl tissues.

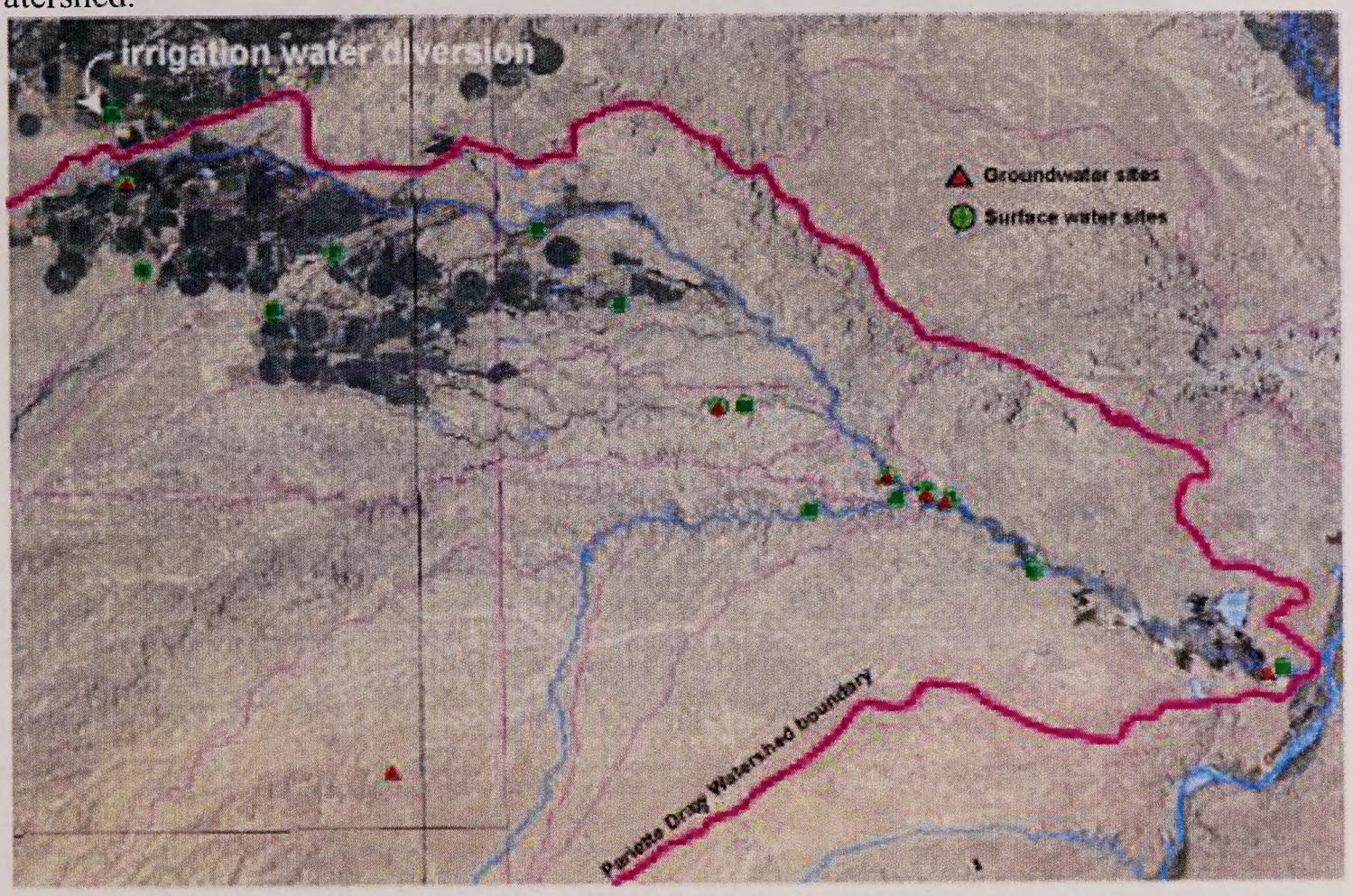
This study also provides a unique opportunity for educational institutions to develop a regionally important study program benefitting federal, state, and private entities as well as provide hands-on learning, training, and educational development opportunities for students in physical sciences and water resources in the Uintah Basin.

To date research efforts have involved sample collection and monitoring. This includes measurement of total Se, as well as Se species in wetland soils, sediments, pore waters, and the water column. Researchers are also investigating the role that salinity and organic matter play in Se biogeochemistry.



Mineralogical Controls on Salinity and Related Elements Impacting the Pariette Draw and Wetland

Land managers must decide whether or not the salt, Se, and B contaminants in the watershed can be managed, and what sustainable mitigation strategies are possible. To accomplish this, knowledge about the source, cycling, and transport of contaminants throughout the watershed and the effect of land-use practices is critical. The focus of this project is to provide the geological, mineralogical, and geochemical data needed to model these processes in the watershed.



To date, samples have been collected at sites that weather under natural and irrigated conditions. Samples include soil profiles from cultivated and the natural landscape, rock from the formations that crop out in the watershed, and surface - and groundwater from streams, ponds, springs, and auger holes.

Arid Land Study

This project involves reclamation techniques on disturbed arid land field trials. The disturbance is located on arid lands with harsh soils that contain high amounts of salts and sodium. Reclamation success following disturbance on these harsh soils has been quite poor.

The project area is located within the Pariette Watershed which drains into the Pariette Wetlands. Over the last five years energy related development has resulted in the disturbance of several thousand acres of salt and sodium affected soils that have not been successfully reclaimed. This has resulted in a large increase in erosion and sediment rates which have been transported to the wetlands resulting in declines in water quality.

CONTINUATION OF WORK PERFORMED IN FY 2013

Pariette Wetlands Salinity/Selenium

Work that has been performed this year includes the collection of water, soil, and vegetative samples as before, but now has also included vertebrate and invertebrate tissue samples within the Pariette Draw drainage. The primary objectives of this study will be satisfied by monitoring water quality as it enters the wetland pond complex, collecting water samples from at least three wetland ponds on a monthly basis to determine the range and concentrations of constituents present, and collecting a minimum of three surface sediment samples from one lateral transect in the same ponds. Vegetation and animal sample data will be collected from the same ponds as identified above.

Mineralogical Controls on Salinity and Related Elements Impacting the Pariette Draw and Wetland

In March, 2013, a field trip was performed to resample agricultural fields sampled in October, 2012 and fill in additional data gaps. Analyses of these samples were completed by June, 2013. Researchers are currently waiting for analyses of 2012 soil extracts and water samples. Once received, they will assemble a compilation of all the data from this study to be published as an

addendum to their final report. The compilation will provide the foundation for their spatial analyses of contaminants in the Pariette Draw watershed and provide input for decision-making by land managers in the future. Their final report on mineralogical controls on salinity and other contaminants in the Pariette Draw watershed is scheduled for completion by December 2013. An oral presentation to Colorado River Salinity Control Forum and BLM will be scheduled at the end of 2013.

Arid Land Study

This project is entering its' fourth phase of an ongoing assistance agreement that has been in place to study reclamation of disturbed arid lands. This phase will involve field trials of different reclamation techniques to determine the efficacy of treatments such as seeding mixtures, mulching rates, soil amendments, fertilizer, etc., in efforts to reach successful reclamation. By learning what is required to reclaim disturbed arid lands with high sodium and salt contents, the energy industry along with other involved parties will be able to apply these techniques to disturbed areas thereby reducing the amount of produced sediment and salts presently being introduced into Pariette Wetlands and ultimately the Green River.

2013 EOY Eightmile Salinity Report

In 2013, the Grand Staircase-Escalante National Monument received a BPS award for $10,000 to repair a Salinity Control structure by extending the dam, repairing the spillway, and if funding was available repair the head cut. An additional $75,000 in funding was awarded to increase the amount of work to be completed.

The work originally slated for 2013 was to extend the dam approximately 150 feet, and rebuild the spillway. If any funding was left, rehab on the head cut would be initiated. With the increase in funding the GSENM was able to extend the dam, restore the spillway, begin rehab on the head cut, construct a spreader dam to diffuse the energy of the water hitting the main dam and prep some work for the 2014 BPS submission. Due to a delay in processing the contract purchase request, Phase 1 of the project was not completed by August 29, as scheduled, but began the week of the 29th. We had desired to do the work before the summer monsoon season which typically shows up mid to late July, but came early this year and has continued through August and now into September. We were fortunate enough that the moisture fell all around the project area, but not until the end of the first week of September did it affect the project area.

Figure 11 - Project before implementation

Figure 12 - Area cleared of tamarisk; begin work on dam extension. Existing dam on right and tamarisk forest center.

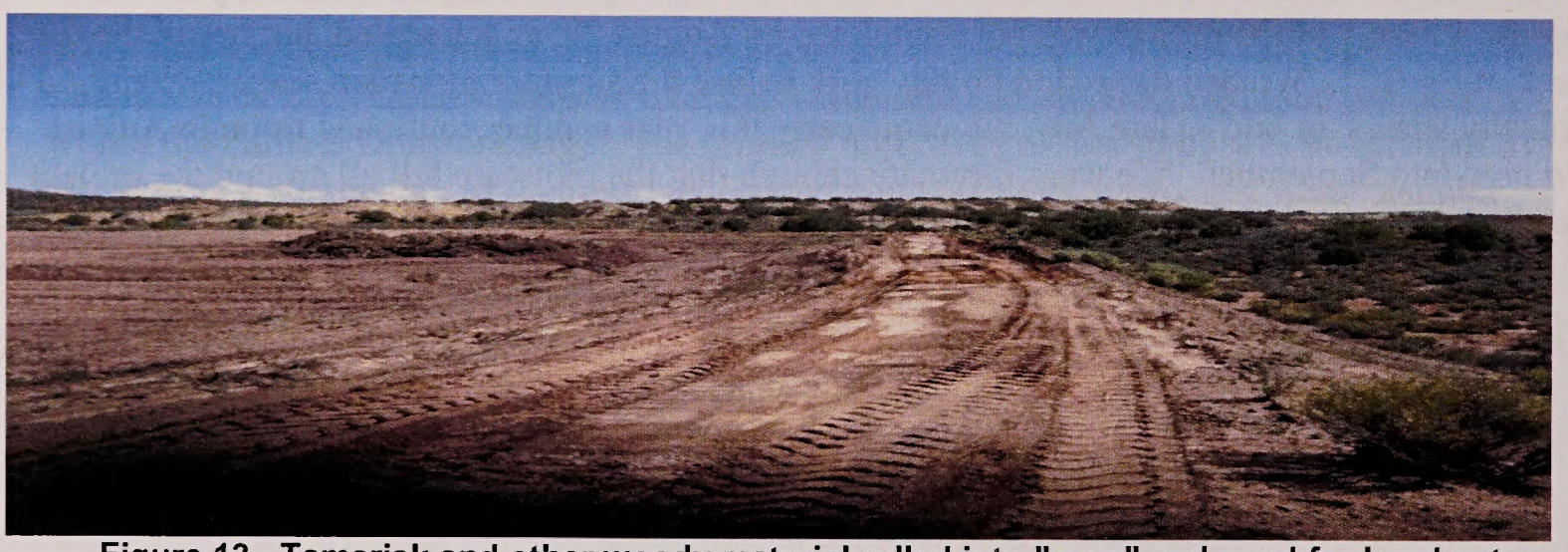


Figure 13 - Tamarisk and other woody material rolled into "rope" and used for head cut rehabilitation.

When we were delayed by the purchase request, the team decided that we should close the spreader dam so that any monsoonal moisture would not directly affect the project working area. If this water had reached the work area the project would have essentially been shut down until the water could have been pumped out or evaporated, but would have essentially halted work progress for the remainder of the fiscal year.

Figure 14 - Operators closing the end of the spreader dam in preparation for expected monsoonal moisture.

Figure 15 - Two days after the spreader dam was closed, it caught moisture that would have stopped the project for 2013

Figure 16 - New dam extension looking west

Although the project has been delayed by rain a little over a week, the project s original phase 1 (extending dam, rebuilding spillway) will be completed and 1/3 of the head cut will be rehabilitated by the end of the fiscal year.

Figure 17 - Current spillway from new dam extension

Because this report is due before this phase will be completed for the year there are no finished photos. Those photos included show the progress of the project to this point in time. The current spillway (Figure 7) was at same level as drainages and washes running into the Eightmile Reservoir impoundment. This situation was a major cause of the existing head cut.

Figure 18 - New spillway base from new dam extension

Figure 8 showing the shaping of the new spillways base replacing the existing "natural" spillway. This will be compacted, have geo-tensile material installed, and rip-rap placed over the material to maintain the spillways integrity. This spillway work is just above the beginning of the head cut and will proceed down through the head cut with the treatment and rehab effort. The plan for the head cut rehabilitation included tying into the banks natural materials like juniper trees, large rock and other materials to place in the cut in order to collect material and build up the existing cut areas to slow water velocities down the drainage. The materials were tied into the banks to hold. Juniper trees were placed pointing up drainage so that material placed in the drainage would spread branches and catch more soil.

Figure 19 - Head cut before rehab (approximately 15 feet deep)

Figure 20 - Initial head cut rehab work. Ties are put in, compacted, and contoured.

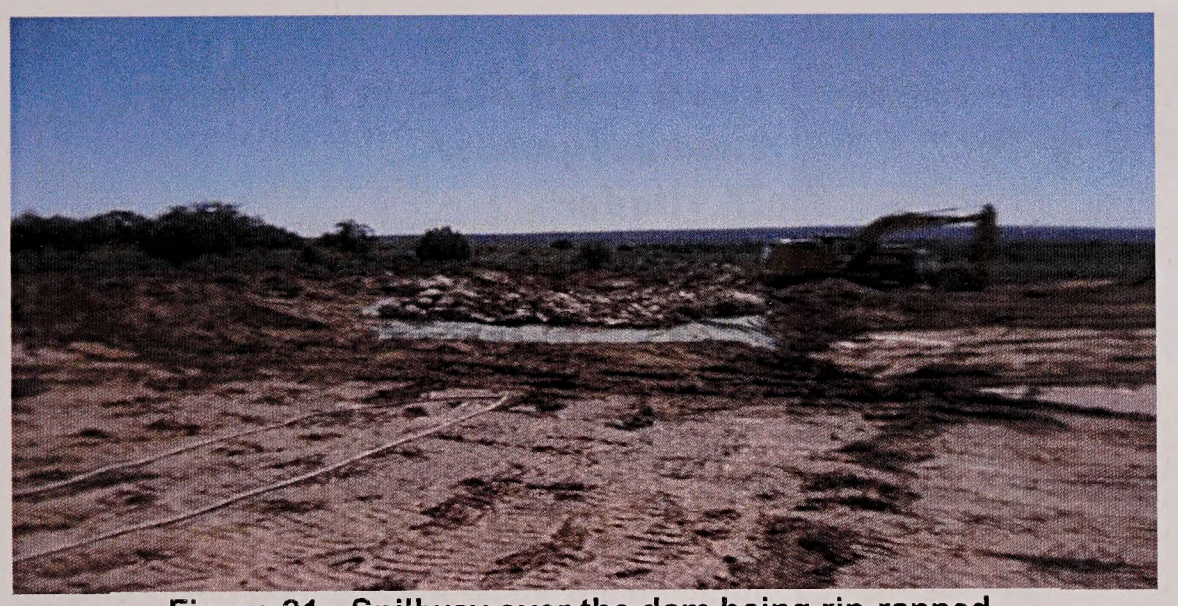


Figure 21 - Spillway over the dam being rip-rapped.

Bids for the equipment came in from $32,000 to $90,000. The contractor who was awarded was a local southern Utah business who provided excellent service and was easy to work with. We would recommend them to other offices.

Table 6 summarizes the funds expended for the 2013 Eightmile Salinity Project.

Table 6 - Funding and expense table

Budget Item	Phase 1 approximate Original Budget	Phase 1 Approximate Actual Budget	Comments
Contracts	$ 35,000.00	$ 31,343.10	Local contractor equipment bid was close to Gov. estimate
Labor	$ 27.000.00	$ 28,187.10	
Materials/Equipment/Supplies	$ 11,000.00	$ 11,626.25	
Fuel and Lubricants	$ 9,000.00	$ 5,914.80	Rain delays caused work to shut down and we did not use as much fuel dollars as expected which in turn resulted in only doing 1/3 of the head cut rehab
Tools/Overages/Unexpected Costs	$ 5,000.00	$ 3,547.56	
Travel		$ 1,078.46	Engineer
Total	$ 85,000.00	$ 81,697.67	+ $ 3,302.33

Phase 1 has already shown its value by impounding heavy runoff behind the spreader dam 200 yards long and 8 feet deep. Inlets have been closed by silt ponds to keep the main reservoir dry until Phase 2 can be initiated.

Figure 22 - Track hoe adding material to spreader dam.

Figure 233 – Adding to and building the base of the dam extension.

Wyoming: received $130,000 (17.3% of salinity fund)

The WY State Lead, which will soon be a vacant spot, reported 7,000 acres of soil survey completed.

Bureau of Reclamation
Colorado River Basin Salinity Control Program
Accomplishments for Fiscal Year 2013
Salinity Modeling Studies

TDS Forecast Modeling

In FY 2013 Reclamation continued to conduct water quality modeling to project TDS concentrations below Hoover Dam forward two years. To project TDS concentrations below Hoover Dam, Reclamation modeled TDS in the two reservoirs, Lakes Powell and Mead, using CE-QUAL-W2 models. Reclamation's "24-Month Study" provided monthly reservoir inflows, outflows, and pool elevations for the modeling. The results of the April 2013 simulation projected TDS concentrations below Hoover Dam would increase from 2013 levels of 560 mg/L to 600 mg/L by the end of 2014.

Economic Impacts Model

The Salinity Damages Model estimates the quantitative damages that are incurred in the metropolitan and agricultural areas in the lower Colorado Basin that receive Colorado River water. The model estimates the impacts from salinity levels greater than 500 mg/L TDS on household water using appliances, damages in the commercial sector, industrial sector, water utilities, and agricultural crop revenues. It also estimates the additional costs related to meeting state wide water quality standards for ground water and recycled water use in the Metropolitan Water District (MWD) service area.

In FY13 the Salinity Damages Model, using the same base data as was used in the 2011 Triennial Review, was updated with historic 2010 TDS levels. The model was also used to estimate damages assuming the salinity program, as implemented through 2010, had never existed.

Estimated 2010 Damages

Through 2010 an estimated 1.185 million tons of salinity control had been implemented. The observed 2010 TDS levels at Hoover, Parker, and above Imperial Dams were 575, 595, and 690 mg/l respectively. At these TDS levels the salinity-caused damages were estimated to be $295 million in 2010. Table 7 presents the annual damages at each location and for different damage sectors.

Table 7 - Annual Damages: Historic 2010 TDS Levels

Damages	2010 Damages With Plan of Implementation				% of Damages
	Hoover (575)	Parker (595)	Imperial (690)	Total	
Agricultural	$0	$37,516,000	$114,625,000	$152,141,000	52%
Household	$11,730,000	$70,691,000	$1,618,000	$84,039,000	28%
Commercial	$2,221,000	$17,043,000	$320,000	$19,584,000	7%
Utility	$1,225,000	$8,827,000	$119,000	$10,171,000	3%
Industrial	$821,000	$9,928,000	$1,913,000	$12,662,000	4%
Groundwater	$0	$10,759,000		$10,759,000	4%
Recycled Water	$0	$5,568,000		$5,568,000	2%
	$15,997,000	$160,332,000	$118,595,000	$294,924,000	
% of Damages by Dam	5%	54%	40%		

Estimated 2010 Damages without Salinity Control Program

TDS levels based on not having the salinity control program as implemented through 2010 (1.185 million tons) were estimated at 656, 678, and 788 mg/l for Hoover, Parker, and Imperial Dams respectively. These TDS levels would have resulted in salinity-caused economic damages to the Lower Basin of approximately $488 million annually. Not having the salinity control program in place would have resulted in increased salinity damages of $193 million ($488 million minus $295 million) when compared with the historic 2010 damages. Table 8 presents the annual damages at each location and for different damage sectors.

Table 8 - Annual Damages: Without Program Estimated 2010 TDS Levels

Damages	2010 Damages Without Program				% of Damages
	Hoover (656)	Parker (678)	Imperial (788)	Total	
Agricultural	$0	$70,264,000	$175,775,000	$246,039,000	50%
Household	$24,440,000	$111,669,000	$3,017,000	$139,126,000	29%
Commercial	$4,596,000	$26,084,000	$592,000	$31,272,000	6%
Utility	$2,527,000	$16,276,000	$222,000	$19,025,000	4%
Industrial	$1,737,000	$16,099,000	$2,885,000	$20,721,000	4%
Groundwater	$0	$20,977,000	$0	$20,977,000	4%
Recycled Water	$0	$10,553,000	$0	$10,553,000	2%
	$33,300,000	$271,922,000	$182,491,000	$487,713,000	
% of Damages by Dam	6%	55%	39%		

Other Work Accomplished in FY13

Updating portions of the Salinity Damages Model were undertaken in 2013. A consultant was hired to prepare a literature review of salinity damage models. This was accomplished. After completing the literature review, the consultant was relieved of his duties and a search for a new consultant begun. In cooperation with the Metropolitan Water District (MWD) and the Southern California Salinity Coalition, the Bureau of Reclamation is planning a workgroup meeting with various consultants to continue with the process of updating the Salinity Damages Model.

Science Team

To further improve and expand our knowledge of salinity control methods, data, and modeling within the Colorado River basin, the Salinity Science Team was created. This team incorporates technical experts and coordinators from each Federal agency (Reclamation, USDA, NRCS, BLM, and USGS) that provides salinity data and/or modeling and the Forum's Executive Director. For more information on the Science Team, please refer to the last section of the USGS Chapter in the 2006 FAR.

The following are some of the topics that were addressed by the Science Team during meetings held in January and August 2013:

1. Lower Gunnison and Uinta Basins Planning Studies
2. Salt loading sources not in salinity control project areas
3. Evaluation of rangeland salt sources
4. Paradox Valley Unit – current operations, 2nd well Consultant Review Board (CRB), Maximum Allowable Surface Injection Pressure CRB, Pilot Evaporation Pond Study, Alternative Study and Environmental Impact Statement.
5. Review of Research, Studies, and Investigations (RSI) proposals for funding and recommending to the Advisory Council's Technical Advisory Group (TAG) which proposals should receive funding.
6. Reports on awarded RSI proposals
7. Pah Tempe Study
8. How to distribute monitoring of salt loading
9. Progress Report No. 24 – Salinity Facts
10. Deriving salt loads for West Blacks Fork (Lyman) and San Juan Basin
11. USGS Report -- Upper Basin Irrigation Layer
12. Knowledge gaps in rangeland salt loading
13. How BLM reports tons of salt control
14. Subsurface flow vs groundwater flow
15. Desert Lakes Monitoring Update
16. Future science direction and needs

Basinwide Salinity Control Program (Basinwide Program)

Funding Opportunity Announcement (FOA)

Reclamation's Upper Colorado (UC) Region released a FOA on August 1, 2012, requesting applications for salinity control projects that reduce salinity contributions to the Colorado River system. Such applications may consist of projects to reduce salinity contributions originating from saline springs, leaking wells, irrigation sources, municipal and industrial sources, erosion of public and private land, or other sources. Only those irrigation-related projects that will reduce salt from delivery systems will be considered, e.g., canals, ditches, or laterals.

In the FOA, applications were accepted for projects that cost Reclamation's Salinity Control Program $6 million or less and control more than 300 tons of salt. The following are general guidelines on how applications were selected for award.

1. Highest ranking applications with more than 1,000 tons will be selected to be awarded and funded under Reclamation's Basinwide Program.

2. Additional high ranking applications with more than 1,000 tons could be selected to be awarded under the Basinwide Program but funded by Basin States Program (BSP) administered by Reclamation.

3. Highest ranking applications with more than 300 tons but less than 1,000 tons and a cost effectiveness of $150 or less per ton may be selected by state to be funded under the BSP and awarded agreements administered by a state agency or administered by Reclamation. An application with a cost effectiveness greater than $150 per ton may only be selected if the project will enable significant on-farm salinity control features to be constructed.

Thirty-six applications were determined to be responsive to the FOA, and of those, twenty-two were for the Basinwide Program and fourteen were for the BSP. Applications were selected through a competitive process under the evaluation criteria set forth in the FOA. Applications were evaluated and ranked by an Application Review Committee (ARC) in December 2012. After evaluating and ranking the applications, the ARC determined that there were eleven applications in the Basinwide Program eligible for funding. Reclamation planned to award cooperative agreements totaling over $38 million to those eleven applications in the Upper Colorado River Basin states of Colorado, Utah, Wyoming, and New Mexico that would have controlled over 31,000 tons of salt loading annually. In March, three entities with lower-ranked applications, totaling about $10 million, received letters from Reclamation informing them that, due to decreases in the Basinwide Program's budget, Reclamation will not award a cooperative agreement for their application. The remaining eight agreements will be funded under the Basinwide Program, comprised of appropriations and cost-share funds from the Upper and Lower Colorado River Basin Funds (Basin Funds).

The ARC determined that of the fourteen applications for the BSP, three applications were eligible for funding in Colorado. The Colorado State Conservation Board plans to award and administer the three agreements totaling more than $2.3 million and will control nearly 1,500

tons of salt loading annually. The ARC recommended that instead of funding any of the applications received under the BSP for Utah that an application received under the Basinwide Program be funded under Utah's BSP. The Utah Department of Agriculture and Food plans to award and administer the agreement totaling more than $2.9 million and that will control over 2,200 tons of salt loading annually.

All salinity projects are required to replace incidental wildlife habitat losses concurrent with construction of salinity features and maintain this habitat for the life of the project.

Price – San Rafael River Basins, Utah

Huntington Cleveland Irrigation Company (HCIC) Project: The Project is located in northern Emery County, in and around the towns of Huntington, Lawrence, Cleveland, and Elmo. The Project was selected in the 2004 Request for Proposals (RFP) and awarded a cooperative agreement in September 2004. A new cooperative agreement was executed in November 2006, and was modified again in September 2009. Approximately 350 miles of open earthen canals and laterals are being replaced with a pressurized pipeline distribution system (Distribution System) to accommodate sprinkler irrigation on about 16,000 acres. Funding for this project is being shared between Reclamation's Basinwide Program, HCIC, NRCS's EQIP, the Parallel Program, and Rocky Mountain Power, formally known as Utah Power and Light. The last of Reclamation's share of $17,116,336 for the Off-farm Distribution System was obligated in 2008. Reclamation can provide up to an additional $6,000,000 in funding equally 50/50 with HCIC funds for completion of the Distribution System. Since 2009, Reclamation has provided over $4,000,000 in additional funding. The Project, scheduled to be completed in 2013, will result in the annual reduction of 59,000 reportable tons of salt in the Colorado River at an anticipated cost of approximately less than $100/ton. Of the 59,000 tons of salt, 13,000 are attributed to the Off-Farm Distribution System and 46,000 tons are attributed to the On-Farm Distribution System and the on-farm salinity control measures (sprinklers).

Cottonwood Creek Irrigation Improvement Project: The $6,509,548 Cottonwood Creek Irrigation Improvement Project is located in Emery County, west of Castledale, Utah. It was selected from the applications received in the 2008 FOA. A cooperative agreement was executed in February 2010. Construction began in May 2011, and the project was operational for the 2013 irrigation season. This project replaced approximately 31 miles of earthen canals and laterals with a pressurized pipeline system resulting in a reduction of 2,094 reportable tons of salt in the Colorado River. It is expected that the pressurized pipeline will induce on-farm improvements resulting in the annual reduction of an additional 9,100 reportable tons of salt. It is anticipated that the project will result in the total annual reduction of 11,194 reportable tons of salt in the Colorado River at an anticipated cost of approximately $59 per ton of salt.

Blue Cut/Mammoth Unit, Cottonwood Creek Consolidated Irrigation Company Salinity Project: The $5,500,000 Blue Cut/Mammoth Unit, Cottonwood Creek Irrigation Company Irrigation Project was selected from the applications received in the 2012 FOA. A cooperative agreement was executed in August 2013. This project is in the design phase with construction expected to begin by December of 2013. This project will replace approximately 45.6 miles of earthen canals and laterals with a pressurized pipeline system resulting in the reduction of 3,789

reportable tons per year of salt in the Colorado River at an anticipated cost of approximately $67.57 per ton of salt. The pressurized pipeline will serve 5,680 acres resulting in additional on farm salt savings.

Uintah Basin, Utah

Ouray Park Canal Rehabilitation Project: This project is located in Uintah County in the vicinity of Gusher, Utah. It was selected from the applications received in the 2010 FOA. A cooperative agreement was executed in September of 2011, for the amount of $2,676,000. This project replaces approximately 5.2 miles of the Ouray Park Canal with irrigation pipe completing a 20.5 mile system. This allows for total abandonment of the 13 mile Ouray Valley Canal which carried storage water for one month per year due to previous salinity control agreements. The project results in the annual reduction of 1,662 reportable tons of salt in the Colorado River at an anticipated cost of approximately $79.82 per ton of salt. The project was begun in the fall of 2011 and is now complete.

Hancock-State Road Salinity Reduction Project: This project is located in Duchesne and Uintah Counties in the vicinity of Roosevelt, Utah. It was selected from the applications received in the 2010 FOA and funded with funding from the Basin States Program. A Cooperative Agreement was executed in March of 2012, for the amount of $2,315,250. This project will replace approximately 20.83 miles of earthen canal and laterals with irrigation pipe resulting in the annual reduction of 1,759 reportable tons of salt in the Colorado River at an anticipated cost of approximately $65.25 per ton of salt. The project was begun in the fall of 2011 and approximately 50 percent was in service for the 2012 irrigation season. Project completion is scheduled for spring of 2014.

Manila-Washam Salinity Area, Utah

South Valley Lateral Salinity Project: This project is located in Daggett County south of the town of Manila, Utah. It was selected from the applications received in the 2012 FOA and was submitted by the Sheep Creek Irrigation Company. A cooperative agreement was executed in May of 2013, for the amount of $4,026,264.75. This project will replace approximately 27,400 feet of earthen laterals with irrigation pipe resulting in the annual reduction of 3,373 reportable tons of salt in the Colorado River at an anticipated cost of approximately $55.57 per ton of salt. The project will begin in the fall of 2014. Project completion is scheduled for spring of 2016.

Big Sandy Project, Sweetwater County, in the vicinity of Farson and Eden, Wyoming

Eden Valley, Eden Canal, Laterals E-5 and E-6 Project: This project was selected in the 2010 FOA. A Cooperative Agreement was executed in September of 2011, for the amount of $1,712,968.50. This project will replace approximately 1.43 miles of earthen laterals with irrigation pipe and line 1.38 miles of the Eden Canal with an impermeable layer resulting in the annual reduction of 1,101 reportable tons of salt in the Colorado River at an anticipated cost of approximately $77.13 per ton of salt. Laterals E-5 and E-6 are completed, and work on the Eden Canal began in the fall of 2012 and was completed in the spring of 2013.

Eden Valley, Farson/Eden Pipeline Project: This project was selected in the 2008 FOA. A Cooperative Agreement was executed in February of 2009, for the amount of $6,453,072. This project will replace approximately 24 miles of earthen laterals with irrigation pipe resulting in the annual reduction of 6,594 reportable tons of salt in the Colorado River at an anticipated cost of approximately $52.57 per ton of salt. Laterals E-7, E-8, and E-13 are completed, and work on the West Side Canal is currently being accomplished. The project is scheduled to be completed by December 2013.

West Blacks Fork Salinity Area, Wyoming.

Austin/Wall Off-Farm Irrigation Project: This project is located in Uintah County in the vicinity of Lyman, Wyoming. It was selected from the applications received in the 2012 FOA and was submitted by the Austin/Wall Irrigation District. A cooperative agreement was executed in May of 2013, for the amount of $1,350,000. This project will replace approximately 32,000 feet of earthen canal and laterals with irrigation pipe resulting in the annual reduction of 1,092 reportable tons of salt in the Colorado River at an anticipated cost of approximately $57.55 per ton of salt. The project is scheduled to begin construction in the fall of 2014, and be completed in the spring of 2015.

Gunnison Basin, Colorado

Uncompahgre Valley Water Users Association (UVWUA) Phase 4 Project: As a result of the 2008 FOA, the UVWUA was awarded a cooperative agreement for Phase 4 of the East Side Lateral (ESL) in December 2008. This phase involves an additional 11 miles of laterals under the Selig and East Canal systems and the reduction of about 3,700 tons of salt loading annually. Approximately $2 million of salinity-control funding will be supplemented with approximately $800,000 from a Section 319 grant obtained through the Colorado Division of Public Health and Environment. Construction of one short lateral was completed in FY 2009. Additional laterals were completed in FY2010-11 and the remaining portions of Phase 4 were completed in 2012.

UVWUA Phase 5 Project: As a result of the 2010 FOA, the UVWUA was awarded a $4.3 million cooperative agreement for Phase 5 of the ESL. This phase involves an additional 19 miles of laterals under the Selig and East Canal systems and the reduction of about 5,034 tons of salt loading annually. Construction began in November 2011 and will continue through 2015.

UVWUA Phase 7 Project: As a result of the 2010 FOA, the UVWUA was awarded a $3.2 million cooperative agreement for Phase 7 of the ESL. This phase involves an additional 12.7 miles of laterals under the Selig and East Canal systems and the reduction of about 3,029 tons of salt loading annually. Construction will begin in the fall of 2012 and will continue through 2016.

UVWUA Phase 8 – East Side Laterals Project (ESL): As a result of the 2012 FOA, the UVWUA was selected to be awarded a $3.5 million cooperative agreement for Phase 8 of the ESL. This phase involves an additional 14.1 miles of laterals under the South Canal, East Canal and the Loutzenhizer systems and the reduction of about 3,307 tons of salt loading annually. It is anticipated that the cooperative agreement will be executed in FY 2014, construction will begin in the fall of 2014, and will continue through 2016.

Grandview Canal and Irrigation Company Project: Awarded from the 2008 FOA, this project involves piping a portion of the Grandview Canal and several laterals in an area tributary to the North Fork of the Gunnison River near Crawford in Delta County. In July 2009, Reclamation entered into an agreement to provide $5.3 million to pipe 4.8 miles of main canal and 5 miles of laterals and convert about 900 acres of currently flood-irrigated farmland to sprinkler irrigation. Construction began in September 2010 and the off-farm portion was completed in 2012. The habitat mitigation was completed in 2013. The project is expected to reduce salt loading by 4,467 tons/year.

Lower Stewart Pipeline Project: Awarded from the 2010 FOA, this project involves piping a portion of the Stewart Ditch & Reservoir Company (SDRC) existing unlined canals in a tributary to the North Fork of the Gunnison River near Paonia, Colorado. In September 2011, Reclamation entered into an agreement to provide up to $6.0 million to pipe 11.5 miles of existing canals with an expected salt load reduction of about 5,892 tons/year. Construction began in the fall of 2012.

Minnesota Ditch Irrigation Salinity Control – Project 1: Awarded from the 2010 FOA, this project involves piping a portion of the Minnesota Canal & Reservoir Company (MCRC) existing unlined canals in a tributary to the North Fork of the Gunnison River near Paonia, Colorado. In September 2011, Reclamation entered into an agreement to provide up to $3.94 million to pipe 5.2 miles of existing canals with an expected salt load reduction of about 1,364 tons/year. Construction began in the fall of 2012 and was substantially complete in the spring of 2013. Minor items will be completed in fall of 2013.

Minnesota Canal Salinity Control Piping Project Phase II: Awarded from the 2012 FOA, this project involves piping the Minnesota Extension portion of the Minnesota Canal & Reservoir Company (MCRC) existing unlined canals in a tributary to the North Fork of the Gunnison River near Paonia, Colorado. In June of 2013, Reclamation entered into an agreement to provide up to $3.03 million to pipe 3.8 miles of existing canals with an expected salt load reduction of about 2,328 tons/year. Construction will begin in the fall of 2014 with an anticipated completion in 2015.

C Ditch/ Needle Rock Project: Awarded from the 2010 FOA, this project involves piping a portion of the C Ditch Company (CDC) existing unlined ditches in a tributary to the Cottonwood Creek drainage of the Gunnison River near Crawford, Colorado. In July 2012, Reclamation entered into an agreement to provide up to $1.43 million to pipe 2.5 miles of existing ditches with an expected salt load reduction of about 714 tons/years. Construction is anticipated to begin in the fall of 2013.

Clipper Irrigation Salinity Control – Project 4: Awarded from the 2010 FOA, this project involves piping a portion of the Crawford Clipper Ditch existing unlined canals in a tributary to the Cottonwood Creek drainage of the Gunnison River near Hotchkiss, Colorado. In September 2012, Reclamation entered into an agreement to provide up to $1.21 million to pipe 3.5 miles of existing canals with an expected salt load reduction of about 1,427 tons/year. Construction is

anticipated to begin in the fall of 2013.

Slack/Patterson Laterals Piping Project: Awarded from the 2012 FOA, this project involves piping of the Slack and Patterson Laterals portion of the Roger's Mesa Water Distribution Association's existing, unlined laterals supplied by Fire Mountain Canal and Leroux Creek, a tributary to the North Fork of the Gunnison River near Hotchkiss, Colorado. In June 2013, Reclamation entered into an agreement to provide up to $3.39 million to pipe 9.1 miles of existing laterals with an expected salt load reduction of about 3,345 tons/year. Construction will begin in the fall of 2014 with an anticipated completion in 2016.

Cattleman's Harts, Hart/McLaughlin, Rockwell, Poulsen Ditch's: Awarded from the 2012 FOA, this project involves piping a portion of the Cattleman's earthen laterals, operated by the Cedar Canyon Iron Springs Irrigation Company and supplied by Crystal Creek, a tributary to the Gunnison River near Crawford, Colorado. In July 2013, Reclamation entered into an agreement to provide up to $2.01 million to pipe 6.3 miles of existing laterals with an expected salt load reduction of about 1,855 tons/year. Construction will begin in the fall of 2013 with an anticipated completion in 2016.

Several iterations of salt load studies have evolved in the North Fork area of the Lower Gunnison Basin over the years. Subsequent iterations are based on new data and techniques that allow for more accurate estimates of off-farm salt loading. Based on these changes, some of the salt load estimates for the above projects have been revised from their original estimates to values based on the current version of the USGS LowGunS Model.

In order to complete the Lower Gunnison Basin mapping project, Reclamation submitted a funding modification in 2013 to the existing, financial assistance agreement with the Colorado State Soil Conservation Board. This additional funding will be used to complete the remaining, off-farm ditch mapping in the Colona and Ridgway areas. In cooperation with irrigation entities, quality assurance checks will also be performed on previously mapped and newly mapped systems in the Lower Gunnison Basin.

Grand Valley, Colorado

Grand Valley Irrigation Company (GVIC) Canal Improvement Grant 2010: As a result of selection under the 2010 FOA, the GVIC was awarded a $2.8 million cooperative agreement to line about 1.9 miles of their main canal and pipe about 4,100 ft. of ditch within the Grand Valley. A salt loading reduction of approximately 1,749 tons annually is expected. The canal lining will consist of a PVC membrane with a shotcrete cover and the pipe will be concrete. Construction began in December 2011, and will continue through 2015.

Grand Valley Irrigation Company (GVIC) Canal Improvement Grant 2012: As a result of selection under the 2012 FOA, the GVIC was selected to be awarded a $4.9 million cooperative agreement to line about 2.4 miles of their main canal within the Grand Valley. A salt loading reduction of approximately 4,001 tons annually is expected. The canal lining will consist of a PVC membrane with a shotcrete cover. The cooperative agreement will be executed in FY 2014, construction will begin in December 2014, and will continue through 2017.

Paradox Valley Unit (PVU), Colorado

This project intercepts extremely saline brine (260,000 mg/l total dissolved solids) before it reaches the Dolores River and disposes of the brine by deep well injection (injection interval about 14,000 feet below ground surface).

Induced seismicity and the increasing pressure necessary to inject the brine into the disposal formation at 14,000' are the limiting factors of the project. As the formation fills with brine, the pressure necessary to inject increases (Table 5). As the pressure increases, the potential for increased seismicity may exist. In January 2013, a M4.4 earthquake occurred that caused Reclamation to modify injection operations which included a new shut down schedule and injection rate reduction. Those modifications have significantly decreased the injection pressure which could result in additional life of the well. The current projected life of the well remains at 3 to 5 years.

The project continues to intercept and dispose of 100,000+ tons of salt annually.

Without Paradox Modeling

The CRSS model was used to estimate the impacts to the Colorado River system if all the salt from the PVU were to enter the river in a without PVU scenario. In summary, by 2030 salinity would increase by 9-10 mg/L at all three numeric criteria sites in the lower Colorado River, with or without the plan of implementation. The probability of exceeding the numeric criteria increases by 3percent for the "without additional controls" scenario and by about 1 percent for the "with plan of implementation" scenario.

The CE-QUAL-W2 model of Lake Powell was used to assess the timing of increase in salinity below Glen Canyon Dam. It was assumed that PVU ceased controlling salt in January of 2002. TDS increased by 0.5 mg/L in 2002, by 4.5 mg/L in 2003, and by 8.9 mg/L in 2004. From 2005 to 2008 the increase above historic values ranged from 7 to 10 mg/L. The timing in the increase of salinity below Glen Canyon Dam was two years. Similar modeling for Lake Mead and Hoover Dam was not completed but it was estimated to take approximately another two years for the full increase in concentration to be realized below Hoover Dam. If PVU operations ceased, it would take approximately 4 years to see the full effects in the Lower Basin.

The effects of losing PVU in the Colorado River upstream of Lake Powell and in the Dolores River were examined using historic river concentrations and PVU injection rates. In the Dolores River reach from Paradox Valley downstream to the first significant tributary, San Miguel River, the increase in TDS is estimated to be over 700 mg/L (2x increase in TDS for this reach). From the Dolores River at its confluence with the San Miguel downstream to the Colorado River the increase is estimated to be 237 mg/L. The increase in the concentration of the Colorado River from the confluence with the Dolores River to the confluence with the Green River is estimated to be 20 mg/L. While the increases in TDS in the Dolores River are significant no water quality standards in Colorado or Utah would be violated.

Alternative Study

At the request of the Salinity Control Forum, Reclamation began exploring and development of a pilot study to evaluate evaporation ponds as a viable method for salt disposal at Paradox. In 2012, Reclamation continued to have meetings and discussion with the BLM, Service, EPA, and Colorado Department of Public Health and Environment. Major issues continue to be compliance with the Migratory Bird Treaty Act, permitting requirements for disposal of the brine evaporate and pond liner, and high levels of hydrogen sulfide. Initial cost estimates are dependent on site selection and environmental regulatory requirements. Reclamation continues to work to find a suitable site for the pilot study and refine cost estimates. Implementation of the pilot study is also dependent on obtaining a land withdrawal from BLM.

Reclamation also began the process of beginning an alternative study/environmental impact statement for alternatives to replace the existing injection well. A Notice of Intent was published in the Federal Register on September 10, 2012 and public scoping meetings were held in Paradox, Montrose, and Grand Junction on September 25-27, 2012. Reclamation will prepare a Scoping Summary Report for review in early 2013.

Table 9 - Paradox Well Injection Evaluation

Injection Period	Operational Days[1]	Pressure Start	High Pressure During Period	Injection Period Net Pressure Change	Tons of Salt Injected[2]	No. of Induced Seismic Events	Maximum Magnitude of Induced Seismic Events	Estimated Tons of Salt Entering the River[3]
Jan-May '02[4]	148	1609	4432		52,860	25	2.9	8,469
June-Dec '02[5]	178	929	4593	161	58,953	34	2.2	8,333
Jan-May '03[5]	144	1172	4627	34	53,173	27	2.1	18,037
June-Dec '03[5]	184	1154	4675	48	59,530	106	2.3	11,185
Jan-May '04[6]	140	1201	4640	-35	51,449	47	2.4	20,225
June-Dec '04[7]	160	1091	4541	-99	51,589	57	3.9	6,442
Jan-May '05[5]	140	1038	4736	195	55,024	69	2.4	14,011
June-Dec '05[8]	148	1203	4750	14	46,551	31	2.6	38,582
Jan-June '06[9]	138	375	4680	-70	44,779	10[10]	2.4	53,039
July-Dec '06[5]	162	1084	4797	117	56,920	13[10]	2.1	18,605
Jan-June '07[5]	159	1066	4796	-1	56,068	7[10]	1.1	19,728
July-Dec '07[5]	163	1232	4712	-84	57,395	31	2.6	11,279
Jan-June '08[11]	160	1152	4813	101	54,720	47	1.3	15,305
July-Dec '08[5]	162	1263	4822	9	56,734	61	2.1	16,378
*Jan-Mar '09[5]	84	1246	4756	-66	29,163	20	2.6	22,029
Apr-Sept '09[12]	160	1157	4891	135	55,083	70	2.7	16,507
Oct '09-Mar '10[5]	153	970	4930	39	51,589	91	2.9	32,876
Apr '10-Sep '10[5]	162	1347	4990	60	55,747	75	2.7	17,223
Oct '10-Mar '11[5]	161	1378	5000	10	55,501	43	2.9	22,916
Apr '11-Sep '11[13]	158	1276	5102	102	54,422	63	2.7	11,591
Oct '11-Mar '12	162	1282	5115	6	56,531	59	2.5	21,003
Apr '12-Sep '12	161	1417	5108	-7	55,605	116	1.9	5,507

1 Operational days include partial days of operation which accounts for variations in tons of salt injected
2 Tons of salt injected based on 260,000 mg/L. Brine concentration varies slightly due to seasonal and environmental fluctuations.
3 Tons of salt entering the river based on regression equations (Ken Watts, USGS Administrative Report – "Estimates of Dissolved Solids Load of the Dolores River in Paradox Valley, Montrose County, CO, 1988-2009, August 5, 2010"). The 2010 FAR contained erroneous estimated tons of salt entering the river.
4 Begin 100% brine injection
5 No problems
6 Down from 3/1/04 through 3/7/04 for mechanical problems
7 Implemented quarterly 10-day shutdown schedule from 9/22 to 10/22; M3.9 earthquake on 11/7; plant shut down until 11/18; discontinued 10-day shutdown schedule
8 Down from 11/13/05 through 12/31/05 for mechanical problems
9 Down from 1/1/06 through 1/19/06 and 2/16/06 through 3/2/06 for mechanical problems
10 Seismic data for 2006 and the first half of 2007 is likely incomplete due to seismic network problems
10 Seismic data for 2006 and the first half of 2007 is likely incomplete due to seismic network problems
10 Seismic data for 2006 and the first half of 2007 is likely incomplete due to seismic network problems
11 Down from 4/16-17/08 for mechanical problems
12 Down from 5/18-19/09 for mechanical problems
13 Down from 9/18-9/20 for communication link failure.

* Biannual shutdown schedule changed from winter/summer to spring/fall

Injection Month	Min Pressure	Max Pressure	Monthly Change	Tons of Salt Injected[1]	# of Induced Seismic Events[2]	Max Mag of Seismic Events	Estimated Salt Load[3]	Comments
Apr-13	390	4,250	3,860	4,064	9	0.7	3,351	Start up on April 17 after January 23 M4.4 earthquake. Begin 33 hour weekly shut down schedule and continue to use 2.125" plungers until new 2" plungers are installed.
May-13	3,290	4,452	202	8,752	12	1.8	1,531	33 hour weekly shut down schedule, 2" plungers
Jun-13	3,948	4,685	233	8,311	7	0.8	2,088	June 5 - Start 18 hour weekly shut down schedule and 2" plungers
Jul-13	4,143	4,740	55	8,457	5	1.2	4,802	
Aug-13	4,218	4,710	-30	8,629	3	0.5		

[1]Tons of salt injected based on 260,000 mg/l. PVB concentration varies slightly due to seasonal and environmental fluctuations.

[2]See Seismicity Notes tab

[3]Estimated salt load based on regression equations (Ken Watts, USGS Administrative Report - "Estimates of Dissolved Solids Load of the Dolores River in Paradox Valley, Montrose County, Colorado, 1988 through 2009, dated August 5, 2010") and provisional data provided by USGS. Some daily EC and streamflow discharge values are estimates. See Salt Load Notes tab.

Parallel Program (PP)

Section 205 of the Salinity Control Act (Act) authorizes Reclamation to expend amounts from the Lower Colorado River Basin Development Fund and the Upper Colorado River Basin Fund (Basin Funds) from a surcharge on power produced at Reclamation facilities. Basin Funds are to be used to repay the Treasury the reimbursable cost allocation of salinity projects or provide a cost share amount. This includes appropriations expended by the NRCS in their salinity program under EQIP. The NRCS has questioned its ability to accept Basin Funds for cost sharing directly into its salinity program. Rather than repay the Treasury, the Colorado River Basin States (Basin States), NRCS, and Reclamation developed a "Parallel Program" (PP). Cost share funds from the Basin Funds have been used to accelerate and supplement implementation of the NRCS salinity measures by funding – through state agencies in Colorado, Utah, and Wyoming – salinity control measures that are separate, but parallel to, the salinity control measures implemented by the NRCS. Reclamation, with recommendations from the Basin States, had interpreted the Act to allow funds from the Basin Funds to be expended in the PP to further the general purposes of the Act.

To clarify authority for the administration of the PP, the Basin States prepared and put forth legislation through then-Senator Salazar's office into the 2008 Farm Bill to amend the Act that has now created the Basin States Program (BSP). Public Law 110-246 amended the Act and established the BSP. The BSP is explained in more detail later in the report.

With the creation of the BSP, the PP has been phased out and all funds not used in the PP have become part of the BSP. As of October 15, 2010, the state agencies were no longer authorized to enter into contracts under the PP. Contracts that the state agencies had executed had all practices installed, constructed, or implemented by September 30, 2012, in order to receive reimbursement. The state agencies requested reimbursement from Reclamation until December 30, 2012. The final reimbursements for the PP were made in 2013. Now that the PP has been terminated and final reimbursements made, Reclamation will no longer report on the PP.

Basin States Program (BSP)

Public Law 110-246 amended the Act creating the BSP to be implemented by the Secretary of Interior through Reclamation. Section 205(f) of the Act was amended to provide that cost share obligations be met through an up-front cost share from the Basin Funds. The amendment also authorizes Reclamation to expend the required cost share funds through the BSP for salinity control activities established under Section 202(a)(7) of the Act.

Reclamation has determined that agencies within the upper Basin states to be appropriate partners and has executed cooperative agreements to utilize the services of these state agencies to assist in seeking and funding cost-effective activities to reduce salinity in the Colorado River system. Activities will also benefit the upper Basin states by improving water management and increasing irrigation efficiencies. Interagency agreements have been executed with the NRCS in the states of Colorado and Utah to provide the technical assistance for the BSP.

Utah Department of Agriculture and Food (UDAF)

Significant changes occurred in UDAF's salinity control program this year. This fiscal year UDAF worked under the BSP for the first full year. UDAF's web based tool (ACTS) is now being used for planning, contracting, and data management. All of the PP as well as BSP contracts have been entered into the database, making the database current. UDAF has implemented a public query page in ACTS (http://grantreporting.udaf.utah.gov/Public) where anyone can look at salinity projects managed through UDAF.

With the BSP agreement in place with Reclamation, UDAF working through NRCS's EQIP program has funded 1 project for $13,333.82. The project will treat 12 acres and control 10 tons of salt.

In January of 2013 it was determined that NRCS could no longer provide signed NEPA documentation for projects funded under Reclamation. This has required that Reclamation's environmental staff develop procedures for complying with NEPA and cultural resources requirements for on-farm projects. Presently, environmental staff from Reclamation's Provo Office is completing the NEPA and cultural resources requirements for two on-farm proposals not eligible for fund through the NRCS's EQIP.

Cedar Hollow Salinity Project: This project is located in Daggett County in and around the town of Manila, Utah. It was selected from the applications received in the 2012 FOA and was submitted by the Sheep Creek Irrigation Company. A cooperative agreement was executed in March of 2013 with UDAF through the Basin States Program, for the amount of $2,980,130. This project will replace approximately 34,500 feet of earthen laterals with irrigation pipe resulting in the annual reduction of 2,220 reportable tons of salt in the Colorado River at an anticipated cost of approximately $62.49 per ton of salt. The project will begin in the fall of 2013. Project completion is scheduled for spring of 2014.

UDAF contracted with Emery County Water Conservancy District for data collection of a long term study at Desert Lake, Emery County. UDAF contracted to cover the expenses for a local liaison between URS and residents in the Uintah Basin. This position will assist the Uintah Basin Planning Study identify where salinity dollars can be applied and how to get more program participation.

UDAF's salinity range project has been closed and the remaining funds for this project have been moved to BLM. The Forum's Work Group recommended this action as BLM has employed a scientist with the skills to conduct this study. This project was originally recommended by the Work Group and funded with "Special Project" funds for the purpose of quantifying salinity control and costs associated with such control. Several surface practices were implemented this year and plantings made. BLM will continue to monitor the plantings and work with a local rancher in Emery County.

Colorado State Conservation Board (CSCB)

The Basin States Program (BSP) in Colorado is delivered through six local Conservation Districts that operate within the boundaries of the approved salinity control areas in the State of Colorado. These salinity control areas include the Silt Mesa, Grand Valley, Lower Gunnison, McElmo Creek, and Mancos River salinity areas. The Book Cliff, Mesa, Delta, Shavano, Dolores, and Mancos Conservation Districts receive funds from the Colorado State Conservation Board (CSCB) that in turn receives funding based upon a contract agreement with Reclamation.

The Districts enter into agreements with individual landowners and entities to install approved salinity control projects and/or wildlife replacement projects within salinity control area boundaries. The projects are planned, designed and certified by NRCS or District employees. Ten District employees are paid through BSP funding earned by the NRCS and provided to the CSCB and Conservation Districts.

All projects are planned, designed and certified based upon current NRCS Standards and Specifications. Each participant signs an Operation and Maintenance agreement to remain in effect for the life of the irrigation improvements installed (usually 25 years). Each participant is required to perform proper Irrigation Water Management on the fields in which irrigation improvements were installed. Participants receive a financial incentive for performing Irrigation Water Management.

The Colorado BSP follows planning and contracting procedures in place for the Environmental Quality Incentives Program (EQIP). The projects are planned and contracted using the current NRCS EQIP payment schedule.

Applications are competitively screened and prepared by the NRCS. Applications are funded by districts in order of the best cost effectiveness. All applications meeting NRCS planning standards that result in an annualized cost per ton of less than $150/ton and that were also not eligible for EQIP are considered for funding depending upon funds available. The cost effectiveness and salt loading data used for these calculations are standardized for all salinity control areas in the State of Colorado by the NRCS.

The local Conservation Districts recommend and refer the application for approval to the Colorado BSP coordinator. Upon approval of the application, the District enters into a contract with the applicant for irrigation and/or wildlife improvements based on the current NRCS payment rate. Upon completion of the project, the NRCS certifies the installation, and the District provides a payment to the landowner or entity. Colorado provides payment and periodically requests reimbursement from Reclamation for these payments.

Progress:

BSP projects:
Reclamation has provided $2,000,000 in funding to Colorado. To date, $ 1,239,206 has been obligated for nine new BSP projects. These projects, when completed, will result in salt control of 2155.9 tons and treat and/or serve 611.5 acres at an average cost effectiveness of $51.37/ ton.

One of the approved projects is a wildlife habitat improvement project. Two projects were approved in the Grand Valley area, and seven projects were approved in the Lower Gunnison area.

The two projects in the Grand Valley area have been completed this past year, resulting in 1,029 tons of annual salt control. The wildlife project has also been installed resulting in two acres of additional habitat in the Lower Gunnison area. Four of the remaining projects are under construction, and two of the projects are currently being designed.

Grand Valley Wildlife Project:
The Colorado State Conservation Board has contracted with Colorado Parks and Wildlife (CPW) to fund approximately 600 acres of wildlife improvements along the Colorado River in the Grand Valley for a cost of $804,315, utilizing BSP special funding received from Reclamation in 2013. This project is expected to begin construction this fall. This project has been planned and designed as a joint effort with CPW, FWS, and NRCS. Completion of this project will satisfy the remaining acres of replacement habitat required in the Grand Valley salinity unit.

Reclamation Funding Opportunity Announcement (FOA):
Colorado was pleased to be involved in Reclamation's FOA process. The expansion of the ranking and selection criteria to include projects from 300 tons of salt control to 1000 tons of salt control will allow more coordination with EQIP and BSP on-farm salinity control improvements.

Colorado has contracted with three projects selected through Reclamation's 2012 FOA process, for a total cost of approximately $2.3M.

Clipper Ditch Zanni Lateral Salinity Control Project: Awarded from the 2012 FOA, this project involves piping the unlined, Zanni Lateral portion of the Clipper Ditch, owned and operated by the Crawford Clipper Ditch Company and supplied by Smith Fork Creek, a tributary to the Gunnison River near Crawford, Colorado. Funded under the Basin States Program, the State of Colorado entered into an agreement to provide up to $1.02 million to pipe 1.6 miles of existing lateral with an expected salt load reduction of about 551 tons/year. Construction will begin in the fall of 2013 with an anticipated completion in 2017.

Forked Tongue/Holman Ditch Piping Project: Awarded from the 2012 FOA, this project involves piping the unlined, Forked Tongue Ditch, operated by the Forked Tongue/Holman Ditch Company and supplied by Forked Tongue Creek, a tributary to the North Fork of the Gunnison River near Eckert, Colorado. Funded under the Basin States Program, the State of Colorado entered into an agreement to provide up to $0.7 million to pipe 2.1 miles of existing ditch with an expected salt load reduction of about 412 tons/year. Construction will begin in the fall of 2013 with an anticipated completion in 2014.

Siphon Lateral Salinity Reduction Project: Awarded from the 2012 FOA, this project involves piping the unlined, Siphon Lateral portion of the Vernal Mesa Canal, operated by the Bostwick Park Water Conservancy District and supplied by several tributaries to the Gunnison River near Cimarron, Colorado. Funded under the Basin States Program, the State of Colorado entered into an agreement to provide up to $0.7 million to pipe 1.8 miles of existing lateral with an expected

salt load reduction of about 413 tons/year. Construction will begin in the fall of 2013 with an anticipated completion in 2015.

Ditch Mapping:

Colorado received $ 34,000 in special BSP funding this year to complete ditch mapping activities in Ouray County in the Lower Gunnison area, and to review and complete data for ditch mapping previously completed in other portions of the Lower Gunnison area. This project is currently underway.

Summary Data
Colorado River Basin Salinity Control Program

The Summary Tables of the Federal Salinity Control Programs will be provided to the Advisory Council upon completion.

Summary of Federal Salinity Control Programs

FY 2013

Salinity Unit		Tons / Year Removed
MEASURES IN PLACE BY RECLAMATION		
Basinwide Program		214,800
Basin States Program (BSP)	1/	16,500
Meeker Dome		48,000
Las Vegas Wash Pitman		3,800
Grand Valley		122,300
Paradox Valley	2/	100,900
Lower Gunnison Winter Water (USBR)		41,400
Dolores		23,000
Reclamation Subtotal		**571,000**
MEASURES IN PLACE BY USDA/BSP	3/	
Grand Valley		143,000
Price-San Rafael		94,900
Uinta Basin		154,400
Big Sandy River		57,700
Lower Gunnison		114,500
McElmo Creek		27,700
Mancos		4,400
Muddy Creek		100
Manila		9,600
Silt		2,200
Green River		700
Tier 2	4/	5,500
USDA Subtotal		**615,000**
MEASURES IN PLACE BY BLM		
Nonpoint Sources	5/	111,600
Well-Plugging		14,600
BLM Subtotal		**126,000**
Measures in Place Total		**1,312,000**
GOALS TO REACH TARGET		
Reclamation Basinwide Program		306,100
Price-San Rafael (USDA/BSP)		52,000
Grand Valley (USDA/BSP)	6/	0
Uinta Basin (USDA/BSP)	7/	6,100
Big Sandy River (USDA/BSP)		26,000
Lower Gunnison (USDA/BSP)		71,500
McElmo Creek (USDA/BSP)		18,300
Mancos River (USDA/BSP)		7,600
Muddy Creek (USDA/BSP)		11,600
Manila (USDA/BSP)		7,800
Silt (USDA/BSP)		1,800
Green River (USDA/BSP)		5,900
Henry's Fork, WY (USDA/BSP)		6,500
Tier 2 (USDA)	4/	14,500
New Well Plugging and Nonpoint Source (BLM)		0
Goals Subtotal		**536,000**
Total (Measures in Place + Goals)		**1,848,000**
Target by 2030		**1,850,000**

1/ Off-farm projects funded by Basin States Program
2/ Paradox injection well capacity estimated to decline beginning in 2020; assumed continuation of well or alternative control methods after 2020
3/ May include off-farm controls that were not goaled.
4/ Measures in areas outside approved projects
5/ BLM non-point source are estimates.
6/ Original goal attained
7/ Estimated; original goal attained.

FUNDING FORECAST FOR THE BASINWIDE PROGRAM

Date as of 9/30/2013

Contract Number	Contract Name	End Date	Contract Amount	Obligated to Date	Balance To Obligate	Expended to Date	Balance to Expend	FY 2013 Appropriations & Cost Share	FY 2014 Appropriations & Cost Share	FY 2015 Appropriations & Cost Share	FY 2016 Appropriations & Cost Share	FY 2017 Appropriations & Cost Share
09-FG-40-2880 R09-AP-40-880	Farson/Eden Pipeline Pjct	12/31/2013	$ 6,453,072	$ 6,010,000	$ 443,072	$ 5,062,592	$ 947,408	$ 1,000,000	$ 443,072	$ -	$ -	
R11AC40020	Uncompahgre Eastside Lateral Phase 5	12/31/2015	$ 4,318,122	$ 4,130,522	$ 187,600	$ 3,224,288	$ 906,234	$ 1,560,522	$ 187,600	$ -	$ -	
R11AC40035	Lower Stewart Pipeline Project	9/30/2015	$ 6,000,000	$ 5,424,500	$ 575,500	$ 5,037,744	$ 386,756	$ 3,300,000	$ 575,500		$ -	
R11AC40037	Grand Valley - Canal Improvement (A)	7/15/2015	$ 2,820,928	$ 2,420,000	$ 400,928	$ 1,820,000	$ 600,000	$ 1,320,000		$ 400,928	$ -	
R12AC40002	"C" Ditch/Needle Rock Project	9/30/2013	$ 1,434,885	$ 1,100,000	$ 334,885	$ 97,428	$ 1,002,572	$ 900,000	$ 334,885	$ -	$ -	
R12AC40033	Clipper Irrigation Project	9/30/2013	$ 1,214,140	$ 1,100,000	$ 114,140	$ 24,076	$ 1,075,924	$ 900,000	$ 114,140	$ -	$ -	
R13AC40004	UVWUA East Side Laterals Project Phase 8		$ 3,542,157	$ -	$ 3,542,157	$ -	$ -	$ -	$ 595,000	$ 1,200,000	$ 1,747,157	
R13AC40005	Minnesota Canal Piping Project Phase II	9/30/2015	$ 3,028,762	$ 400,000	$ 2,628,762	$ 114,095	$ 285,905	$ 400,000	$ 1,250,000	$ 1,378,762		
R13AC40003	Slack/Patterson Laterals Piping Project	9/30/2015	$ 3,394,427	$ 385,000	$ 3,009,427	$ 135,050	$ 249,950	$ 385,000	$ 1,209,427	$ 1,800,000		
R13AC40008	Cattleman's Harts, Hart/McLaughlin, Rockwell, Poulsen Ditch's	9/30/2015	$ 2,007,225	$ 272,644	$ 1,734,581	$ -	$ 272,644	$ 272,644		$ 1,100,000	$ 634,581	
R13AC40006	GVIC Canal Improvement 2012	9/30/2017	$ 4,581,825	$ -	$ 4,581,825	$ -	$ -	$ -	$ 400,000	$ 1,100,000	$ 2,050,000	$ 1,031,825
R13AC40017	Austin/Wall Off-Farm Irrigation Project	12/31/2015	$ 1,350,000	$ 150,000	$ 1,200,000	$ 8,352	$ 141,648	$ 150,000	$ 900,000	$ 300,000		
R13AC40019	Blue Cut/ Mammoth Unit	9/30/2016	$ 5,500,000	$ 500,000	$ 5,000,000	$ -	$ 500,000	$ 500,000	$ 1,000,000	$ 2,100,000	$ 1,900,000	
R13AC40015	South Valley Lateral Salinity Project - Sheep Creek	9/30/2016	$ 4,026,265	$ 300,000	$ 3,726,265	$ 75,000	$ 225,000	$ 300,000	$ 1,000,000	$ 1,400,000	$ 1,326,265	
R13AC40021	Huntington Cleveland Project Continuation	4/30/2014	$ 1,109,913	$ 69,857	$ 1,040,056	$ 69,857	$ -	$ 69,857	$ 56,000	$ -	$ -	
	TOTALS		$ 50,781,721	$ 22,262,523	$ 28,519,198	$ 15,668,482	$ 6,594,041	$ 11,058,023	$ 8,065,624	$ 10,779,690	$ 7,658,003	$ 1,031,825
	PROJECTS THAT ARE FULLY OBLIGATED - NOT YET CLOSED OUT											
04-FC-40-2242	Huntington Cleveland Irrig Co.	12/31/2012	$ 22,006,423	$ 22,006,423	$ -	$ 22,006,423	$ -		$ -	$ -	$ -	
R11AC40034	Ouray Park Canal Rehabilitation Project	12/31/2013	$ 2,676,000	$ 2,676,000	$ -	$ 2,676,000	$ -	$ 226,000	$ -	$ -	$ -	
R11AC40030	Minnesota Ditch Project 1	9/30/2015	$ 3,943,272	$ 3,943,272	$ -	$ 3,920,674	$ 22,598	$ 443,272	$ -	$ -	$ -	
	CONTRACT COSTS							$ 11,727,295	$ 8,065,624			
	NON-CONTRACT COSTS							$ 689,812	$ 650,000			
	TOTAL OPEN AGREEMENTS		$ 57,993,923	$ 27,190,742	$ 30,803,181	$ 20,010,537	$ 7,180,205	$ 12,417,107	$ 8,715,624			
Funding	Appropriations S10							$ 7,582,000	$ 5,783,000			
Funding	Cost Share X10							$ 3,249,429	$ 2,478,429			
Funding	Additional Appropriations S10							$ 1,113,000				
Funding	Additional Cost Share X10							$ 477,000				
	TOTAL							$ 12,421,429	$ 8,261,429			
Funding	Appropriations/Cost Share Totals							$ 12,421,429	$ 8,261,429	$ -	$ -	$ -
Costs	Contract/Non Contract Totals							$ 12,417,107	$ 8,715,624	$ -	$ -	$ -
								$ 4,322	$ (454,195)	$ -	$ -	$ -
	BASIN STATES PROGRAM AGREEMENTS SELECTED IN THE FY 2010 FOA - *THESE PROJECTS ARE NOT CALCULATED IN YEARLY APPROPRIATIONS*											
R11AC40015	Farson Eden	12/31/2013	$ 1,712,969	$ 1,712,969	$ -	$ 1,633,548	$ 79,421					
R11AC40025	Uncompahgre Eastside Lateral Phase 7	12/30/2016	$ 3,183,983	$ 1,000,000	$ 2,183,983	$ 493,257	$ 506,743	$ 775,000	$ 1,183,983	$ 1,000,000		
R12AC40031	Hancock - State Road Project	12/31/2013	$ 2,315,250	$ 2,215,250	$ 100,000	$ 2,215,250	$ -	$ 115,250	$ 100,000			
	TOTALS		$ 7,212,202	$ 4,928,219	$ 2,283,983	$ 4,342,055	$ 586,164	$ 890,250	$ 1,283,983	$ 1,000,000	$ -	

COLORADO RIVER BASIN SALINITY CONTROL PROGRAM TITLE II

Upper Colorado River Basin Fund

As of 9/30/2013

A	B	C	D	E	F		G	H		I	J
	Up-front Cost Sharing										
Fiscal Year	Paradox Valley O&M	Grand Valley O&M	McElmo Creek (Dolores) O&M	Lower Gunnison O&M	Basinwide SCP		USDA NRCS SCP	**Total Transfer to UC Region**		**Total Repayment Transfer to Treasury**	**Total Annual Requirement**
1987										6,918	6,918
1988										90,088	90,088
1989										110,531	110,531
1990										156,936	156,936
1991										200,047	200,047
1992										301,475	301,475
1993										451,325	451,325
1994										357,687	357,687
1995										1,934,454	1,934,454
1996										2,750,148	2,750,148
1997					446,000		199,000	645,000		285,643	930,643
1998		184,000			489,000		189,000	862,000		135,666	997,666
1999	109,000	33,000	20,000	20,000	739,000		296,000	1,217,000		87,604	1,304,604
2000	206,000	91,000	26,000	42,000	1,540,000		682,000	2,587,000		0	2,587,000
2001	0	0	0	0	0		0	0		0	0
2002	99,000	45,000	21,000	21,000	658,000		386,000	1,230,000		0	1,230,000
2003	49,000	20,000	5,000		314,000		572,000	960,000		0	960,000
2004	102,000	33,000	20,000		531,000		1,274,000	1,960,000		0	1,960,000
2005	101,000	32,000	22,000		531,000		1,256,000	1,942,000		0	1,942,000
2006	88,000	55,000	22,000		607,000		1,416,000	2,188,000		0	2,188,000
2007	104,000	50,000	25,000		1,676,000	1/	1,286,000	3,141,000	2/	0	3,141,000
2008	134,000	44,000	25,000		513,000		1,106,000	1,822,000		0	1,822,000
2009	115,000	68,000	20,000		1,052,000		1,145,000	2,400,000		0	2,400,000
2010	138,540	70,850	39,407		488,829		1,192,592	1,930,218		0	1,930,218
2011	141,594	51,928	22,178		517,695		958,337	1,691,732		0	1,691,732
2012	130,000	74,000	38,000		506,829		837,579	1,586,408		0	1,586,408
2013	119,150	71,741	25,457		558,964		1,080,000	1,855,312		0	1,855,312
Subtotal	1,636,284	923,519	331,042	83,000	11,168,317		13,875,508	28,017,670		6,868,522	34,886,192
2014	134,000	100,000	18,257		371,764		1,112,143	1,637,626		0	1,736,164
2015	138,540	70,850	39,407		1,109,100		900,000	1,637,626		0	2,257,897
2016	138,540	70,850	39,407		1,168,650		836,000	1,573,626		0	2,253,447
2017	138,540	70,850	39,407		1,228,050		771,000	1,508,626		0	2,247,847
2018	138,540	70,850	39,407		1,287,450		771,000	1,508,626		0	2,307,247
2019	138,540	70,850	39,407		1,346,850		707,000	1,444,626		0	2,302,647
2020	138,540	70,850	39,407		1,406,250		643,000	1,380,626		0	2,298,047
2021	138,540	70,850	39,407		1,485,450		643,000	1,380,626		0	2,377,247
2022	138,540	70,850	39,407		1,564,650		643,000	1,380,626		0	2,456,447
2023	138,540	70,850	39,407		1,643,850		643,000	1,380,626		0	2,535,647
2024	138,540	70,850	39,407		1,723,050		643,000	1,380,626		0	2,614,847
2025	138,540	70,850	39,407		1,802,400		643,000	1,380,626		0	2,694,197
2026	138,540	70,850	39,407		1,901,400		643,000	248,797		1,384,314	4,177,511
2027	138,540	70,850	39,407		2,000,400		643,000	248,797		0	2,892,197
2028	138,540	70,850	39,407		2,099,400		643,000	248,797		0	2,991,197
2029	138,540	70,850	39,407		2,198,550		643,000	248,797		0	3,090,347
2030	138,540	70,850	39,407		2,317,350		643,000	248,797		0	3,209,147
2031	138,540	70,850	39,407					248,797		0	248,797
2032	138,540	70,850	39,407					248,797		0	248,797
2033	138,540	70,850	39,407					248,797		0	248,797
2034	138,540	70,850	39,407					248,797		0	248,797
2035	138,540	70,850	39,407					248,797		0	248,797
2036	138,540	70,850	39,407					248,797		0	248,797
2037	138,540	70,850	39,407					248,797		0	248,797
2038	138,540	70,850	39,407					248,797		0	248,797
2039	138,540	70,850	39,407					248,797		3,200,008	3,448,805
2040	138,540	70,850	39,407					248,797		64,747	313,544
2041	138,540	70,850	39,407					248,797		0	248,797
2042	138,540	70,850	39,407					248,797		347,605	596,402
2043	138,540	70,850	39,407					248,797		158,454	407,251
2044	138,540	70,850	39,407					248,797		0	248,797
2045	138,540	70,850	39,407					248,797		0	248,797
2046	138,540	70,850	39,407					248,797		1,071,189	1,319,986
2047	138,540	70,850	39,407					248,797		1,919,584	2,168,381
2048	138,540	70,850	39,407					248,797		0	248,797
Total	6,480,644	3,432,419	1,689,137	83,000	37,822,931	0	26,045,651	81,207,495		15,014,423	127,309,709

1/ In FY2003 $1,103,000 was transferred from the Upper Basin Fund, but was not transferred into the Salinity Program until FY 2007. The total amount was accounted for in the Basinwide Program portion.

2/ The actual amount transferred from the Upper Basin Fund to the UC Region for the Salinity Program was $2,038,000, of which $573,000 was for the Basinwide Program. Please see footnote 1/ for the explanation of the difference.

COLORADO RIVER BASIN SALINITY CONTROL PROGRAM TITLE II

Lower Colorado River Basin Development Fund (with yearly repayment to projects)

As of 9/30/2013

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
	Repayment																		
				Grand Valley															
	Paradox Valley Unit			Construction Completed								Las Vegas	Lower Gunnison		McElmo Creek		USDA	Transfer to	
Year	Well	Facilities	O&M	Sep-89	Sep-92	Sep-93	Sep-97	Sep-98	Sep-99	Total	O&M	Wash	Construction	O&M	Construction	O&M	NRCS	Treasury	Year
1988											11,410				17,402		27,797	56,609	1988
1989			5,511								14,424				160,515		490,562	671,012	1989
1990			25,242	165,039						165,039	5,178				176,194		595,923	967,576	1990
1991			40,744	165,366						165,366	20,826		683,908		685,579		827,733	2,424,156	1991
1992			54,736	167,566						167,566	24,461		1,018,031		1,022,056	12,857	1,041,545	3,341,252	1992
1993			100,304	170,951	30,755					201,706	25,037		1,800,250	58,374	1,791,857	13,151	1,511,481	5,502,160	1993
1994			90,727	170,982	33,049	65,779				269,810	62,403	36,690	1,481,236	62,335	3,508,286	29,635	2,312,460	7,853,582	1994
1995			104,588	170,982	34,063	66,016				271,061	12,198	7,338	1,265,024	89,901	2,263,383	10,861	1,809,345	5,833,699	1995
1996			523,452	318,081	35,023	66,024				419,128	172,501	11,439	151,911	150,538	407,689	97,918	2,641,054	4,575,630	1996
1997			156,978	23,861	35,347	66,033				125,241	51,373	3,237	45,361	45,222	122,133	29,592	791,145	1,370,282	1997
1998			307,790	171,053	35,713	66,038	134,568	313,270		720,642	108,753	7,338	382,343	61,102	616,036	75,921		2,279,925	1998
1999			52,534	171,053	39,952	66,043	134,689	491,475	58,629	961,841	105,987	7,338	-256		52,823			1,180,267	1999
2000				363,811	39,254	17,978	23,822	540,162	40,109	1,025,136		7,338	1,362		1,139			1,034,975	2000
2001				365,715	39,498	18,064	24,536	512,562	64,761	1,025,136		7,338	1,362		1,139			1,034,975	2001
2002				366,384	39,540	18,152	24,053	523,997	57,847	1,029,973								1,029,973	2002
2003				363,833	41,792	17,978	23,822	523,964	53,747	1,025,136		7,338						1,032,474	2003
2004				363,890	39,275	17,978	23,822	521,838	58,333	1,025,136		7,338						1,032,474	2004
2005				363,376	39,276	17,978	23,822	521,921	58,763	1,025,136		7,338						1,032,474	2005
2006	2,655,420	1,214,010		363,376	39,276	17,978	23,822	521,921	58,763	1,025,136		7,338						4,901,904	2006
2007	264,480	121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338	-383,526		166,259			779,905	2007
2008	264,480	121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338			-577,579			419,593	2008
2009	264,480	121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						997,172	2009
2010	264,480	121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						997,172	2010
2011	264,480	121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						997,172	2011
2012	264,480	121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						997,172	2012
2013	264,480	121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						997,172	2013
Subtotal	4,506,780	2,063,817	1,462,606	7,191,269	803,360	593,152	565,252	4,733,008	989,819	14,875,860	614,551	168,774	6,447,006	467,472	10,414,911	269,935	12,049,045	53,340,757	
2014	264,480	121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						997,172	2014
2015	264,480	121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						997,172	2015
2016	264,480	121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						997,172	2016
2017	264,480	121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						997,172	2017
2018	264,480	121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						997,172	2018
2019	264,480	121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						997,172	2019
2020	264,480	121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						997,172	2020
2021	264,480	121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						997,172	2021
2022	264,480	121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						997,172	2022
2023	264,480	121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						997,172	2023
2024	264,480	121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						997,172	2024
2025	264,480	121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						997,172	2025
2026	264,482	121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						997,174	2026
2027		121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						732,692	2027
2028		121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						732,692	2028
2029		121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						732,692	2029
2030		121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						732,692	2030
2031		121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						732,692	2031
2032		121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						732,692	2032
2033		121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						732,692	2033
2034		121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						732,692	2034
2035		121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						732,692	2035
2036		121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						732,692	2036
2037		121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						732,692	2037
2038		121,401		420,850	40,221	10,159	18,328	37,414	76,981	603,953		7,338						732,692	2038
2039		121,401		420,862	40,221	10,159	18,328	37,414	76,981	603,965		7,338						732,704	2039
2040		121,401			40,221	10,159	18,328	37,414	76,981	183,103		7,335						311,839	2040
2041		121,401			40,221	10,159	18,328	37,414	76,981	183,103								304,504	2041
2042		121,401			40,216	10,159	18,328	37,414	76,981	183,098								304,499	2042
2043		121,401				10,143	18,328	37,414	76,981	142,866								264,267	2043
2044		121,401					18,328	37,414	76,981	132,723								254,124	2044
2045		121,401					18,328	37,414	76,981	132,723								254,124	2045
2046		121,422					18,328	37,414	76,981	132,723								254,145	2046
2047							18,330	37,394	76,981	132,705								132,705	2047
2048									76,998	76,998								76,998	2048
Total	7,945,022	6,070,071	1,462,606	18,133,381	1,969,764	897,906	1,188,406	6,005,064	3,684,171	31,878,692	614,551	366,897	6,447,006	467,472	10,414,911	269,935	12,049,045	132,324,137	

COLORADO RIVER BASIN SALINITY CONTROL PROGRAM TITLE II

Lower Colorado River Basin Development Fund (with yearly repayment to projects)

As of 9/30/2013

A	B	C	D	E	F	G	H	I	J	K	L	M
					Up-front Cost Sharing							
Year	Revenues: Hoover	Revenues: Parker & Davis	Deficiency Payments	Repayment Transfer to Treasury	Paradox Valley O&M	Grand Valley O&M	McElmo Creek O&M	Lower Gunnison O&M	Basinwide SCP	NRCS SCP	Actual and Projected Transfer to UC Region	Actual LCRBDF Balance Available
1987	1,540,705											$ 1,540,705
1988	9,359,325		1,532,868	56,609								$ 9,310,553
1989	8,442,385		1,532,868	671,012								$ 15,549,058
1990	8,899,348		1,532,868	967,576								$ 21,947,962
1991	8,055,138		11,532,868	2,424,156								$ 16,046,075
1992	7,622,748		1,532,868	3,341,252								$ 18,794,703
1993	6,960,422		1,532,868	5,502,160								$ 18,720,097
1994	8,830,220		1,532,868	7,853,582								$ 18,163,867
1995	8,212,818		1,532,868	5,833,699								$ 19,010,118
1996	9,644,684		1,532,868	4,575,630								$ 22,546,304
1997	9,172,879		1,532,868	1,370,282					2,423,000	1,129,000	3,552,000	$ 25,264,033
1998	10,398,524		1,532,868	2,279,925		1,046,000			2,769,000	1,072,000	4,887,000	$ 26,962,764
1999	10,908,408		730,073	1,180,267	616,000	186,000	111,000	116,000	3,503,000	1,683,000	6,215,000	$ 29,745,832
2000	10,410,325			1,034,975	1,210,000	446,000	147,000	237,000	7,875,000	3,868,000	13,783,000	$ 25,338,182
2001	10,255,846			1,034,975	0	0	0	0	1,100,000	0	1,100,000	$ 33,459,054
2002	8,674,271			1,029,973	559,000	255,000	117,000	121,000	3,729,000	2,185,000	6,966,000	$ 34,137,352
2003	8,202,777			1,032,474	558,000	223,000	62,000		3,565,000	6,477,000	10,885,000	$ 30,422,655
2004	8,307,425			1,032,474	579,000	189,000	111,000		3,012,000	7,213,000	11,104,000	$ 26,593,606
2005	6,700,765	448,360		1,032,474	0	0	0		1,954,000	4,627,000	6,581,000	$ 26,129,257
2006	8,174,032	1,462,305		4,901,904	500,000	311,000	122,000		3,451,000	8,015,000	12,399,000	$ 18,464,690
2007	8,008,372	1,418,252		779,905	589,000	283,000	141,000		3,246,000	7,285,000	11,544,000	$ 15,567,409
2008	7,842,785	1,478,287		419,593	700,000	308,000	159,000		2,904,000	6,265,000	10,336,000	$ 14,132,888
2009	7,574,720	1,547,288		997,172	1/ 663,000	1/ 373,000	1/ 154,000		1/ 6,296,000	1/ 6,758,000	1/ 0	$ 22,257,725
2010	7,201,522	1,519,805		997,172	707,493	401,483	223,307		2,770,028	6,388,912	5,475,213	$ 24,506,667
2011	7,846,225	1,593,621		997,172	802,363	294,257	125,676		2,993,608	7,384,155	14,237,779	$ 18,711,563
2012	8,154,240	1,552,976		997,172	764,000	419,000	214,000		572,028	11,046,278	13,015,306	$ 14,406,302
2013	7,657,120	1,562,447		997,172	348,079	206,634	110,506		2,696,443	9,100,000	12,461,662	$ 10,167,036
Subtotal	215,400,909	11,020,893	27,591,621	53,340,757	8,247,856	4,734,740	1,686,983	474,000	52,162,664	81,396,345	144,541,960	
2014	7,742,075	1,457,925		997,172	759,333	566,666	103,457		2,106,665	6,302,143	9,200,000	$ 9,169,864
2015	7,742,075	1,457,925		997,172	700,000	400,000	150,000		3,428,571	6,338,572	9,200,000	$ 8,172,693
2016	7,742,075	1,457,925		997,172	700,000	400,000	150,000		3,428,571	6,411,428	9,200,000	$ 7,175,522
2017	7,742,075	1,457,925		997,172	700,000	400,000	150,000		3,428,571	6,375,000	9,200,000	$ 6,178,351
2018	7,742,075	1,457,925		997,172	700,000	400,000	150,000		3,428,571	6,375,000	9,200,000	$ 5,181,180
2019	7,742,075	1,457,925		997,172	700,000	400,000	150,000		3,428,571	6,375,000	9,200,000	$ 4,184,009
2020	7,742,075	1,457,925		997,172	700,000	400,000	150,000		3,428,571	6,375,000	9,200,000	$ 3,186,838
2021	7,742,075	1,457,925		997,172	700,000	400,000	150,000		3,428,571	6,375,000	9,200,000	$ 2,189,666
2022	7,742,075	1,457,925		997,172	700,000	400,000	150,000		3,428,571	6,375,000	9,200,000	$ 1,192,495
2023	7,742,075	1,457,925		997,172	700,000	400,000	150,000		3,428,571	6,375,000	9,200,000	$ 195,324
2024	7,742,075	1,457,925		997,172	700,000	400,000	150,000		3,428,571	6,375,000	9,200,000	$ (801,847)
2025	7,742,075	1,457,925		997,172	700,000	400,000	150,000		3,428,571	6,375,000	9,200,000	$ (1,799,018)
2026	7,742,075	1,457,925		997,174	700,000	400,000	150,000		3,428,571	6,375,000	9,200,000	$ (2,796,191)
2027	7,742,075	1,457,925		732,692	700,000	400,000	150,000		3,428,571	6,375,000	9,200,000	$ (3,528,883)
2028	7,742,075	1,457,925		732,692	700,000	400,000	150,000		3,428,571	6,375,000	9,200,000	$ (4,261,574)
2029	7,742,075	1,457,925		732,692	700,000	400,000	150,000		3,428,571	6,375,000	9,200,000	$ (4,994,265)
2030	7,742,075	1,457,925		732,692	700,000	400,000	150,000		3,428,571	6,375,000	9,200,000	$ (5,726,956)
2031	7,742,075	1,457,925		732,692	700,000	400,000	150,000		3,428,571	6,375,000	9,200,000	$ (6,459,647)
2032	7,742,075	1,457,925		732,692	700,000	400,000	150,000		3,428,571	6,375,000	9,200,000	$ (7,192,338)
2033	7,742,075	1,457,925		732,692	700,000	400,000	150,000		3,428,571	6,375,000	9,200,000	$ (7,925,030)
2034	7,742,075	1,457,925		732,692	700,000	400,000	150,000		3,428,571	6,375,000	9,200,000	$ (8,657,721)
2035	7,742,075	1,457,925		732,692	700,000	400,000	150,000		3,428,571	6,375,000	9,200,000	$ (9,390,412)
2036	7,742,075	1,457,925		732,692	700,000	400,000	150,000		3,428,571	3,643,000	9,200,000	$ (10,123,103)
2037	7,742,075	1,457,925		732,692	700,000	400,000	150,000		3,428,571	3,643,000	9,200,000	$ (10,855,794)
2038	7,742,075	1,457,925		732,692	700,000	400,000	150,000		3,428,571	3,643,000	9,200,000	$ (11,588,485)
2039	7,742,075	1,457,925		732,704	700,000	400,000	150,000		3,428,571	3,643,000	9,200,000	$ (12,321,189)
2040	7,742,075	1,457,925		311,839	700,000	400,000	150,000		3,428,571	3,643,000	9,200,000	$ (12,633,027)
2041	7,742,075	1,457,925		304,504	700,000	400,000	150,000		3,428,571	3,643,000	9,200,000	$ (12,937,530)
2042	7,742,075	1,457,925		304,499	700,000	400,000	150,000		3,428,571	3,643,000	9,200,000	$ (13,242,028)
2043	7,742,075	1,457,925		264,267	700,000	400,000	150,000		3,428,571	3,643,000	9,200,000	$ (13,506,294)
2044	7,742,075	1,457,925		254,124	700,000	400,000	150,000		3,428,571	3,643,000	9,200,000	$ (13,760,417)
2045	7,742,075	1,457,925		254,124	700,000	400,000	150,000		3,428,571	3,643,000	9,200,000	$ (14,014,540)
2046	7,742,075	1,457,925		254,145	700,000	400,000	150,000		3,428,571	3,643,000	9,200,000	$ (14,268,685)
2047	7,742,075	1,457,925		132,705	700,000	400,000	150,000		3,428,571	3,643,000	9,200,000	$ (14,401,389)
2048	7,742,075	1,457,925		76,998	700,000	400,000	150,000		3,428,571	3,643,000	9,200,000	$ (14,478,386)
Total	717,585,803	76,184,584	55,183,242	133,321,309	42,167,124	24,261,780	8,901,929	948,000	226,271,878	370,475,111		

1/ Upfront cost sharing was created but not requested by the UC Region this year. Cost Share obligations were met by funds already sitting in the UC Region account, mostly from Unliqiudated Obligations in the Parallel Program.

COLORADO RIVER BASIN SA[illegible]Y CONTROL PROGRAM TITLE II

Actual Appropriations and Payme[illegible]rom the Basin Funds 1996 thru 2013

9/30/2013

TOTAL PROGRAM ($1,000)

Unit	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Subtotal	2014	2015	2016	2017
Grand Valley O&M	0	0	3,755	1,363	1,709	685	1,293	1,128	961	700	1,491	1,340	1,228	1,761	1,574	1,889	1,296	1,913	24,087	1,889	1,889	1,889	1,889
Paradox Valley O&M	0	0	1,375	2,032	4,169	2,016	2,685	2,123	2,461	2,019	2,415	2,668	3,212	3,119	3,670	3,776	3,605	3,177	44,523	2,932	2,932	2,932	2,932
Lower Gunnison O&M	0	0	401	455	599	331	321	0	0	0	0	0	0	0	0	0	0	0	2,107	0	0	0	0
McElmo Creek (Dolores) O&M	0	0	405	471	523	313	385	433	474	467	671	459	576	595	747	493	531	566	8,109	531	531	531	531
USBR Basinwide Program	500	6,333	10,858	16,783	21,459	11,891	15,885	12,427	13,090	10,755	12,540	13,870	11,401	25,091	10,863	11,504	11,263	12,421	228,435	8,261	11,429	11,429	11,429
Subtotal (USBR Program)	500	6,333	16,794	21,104	28,459	15,236	20,569	16,111	16,986	13,941	17,117	18,337	16,417	30,566	16,854	17,662	16,696	18,078	307,760	13,614	16,781	16,781	16,781
USDA Program	0	4,428	4,155	5,995	8,355	5,785	13,022	19,763	27,975	25,681	28,962	28,238	25,008	25,949	20,996	25,216	22,914	21,429	313,870	24,286	24,286	22,857	22,857
BLM (no Basin Funds)	800	800	800	800	800	800	800	800	800	800	751	800	800	800	800	800	800	800	14,351	800	800	800	800
Total	1,300	11,561	21,749	27,899	37,614	21,821	34,391	36,674	45,761	40,422	46,830	47,375	42,225	57,315	38,650	43,678	40,410	40,306	635,981	38,700	41,867	40,438	40,438

APPROPRIATIONS EXPENDED ($1,000)

Unit	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Subtotal	2014	2015	2016	2017
Grand Valley O&M	0	0	2,525	1,144	1,172	685	993	885	739	668	1,125	1,007	876	1,320	1,102	1,417	972	1,435	18,065	1,417	1,417	1,417	1,417
Paradox Valley O&M	0	0	1,375	1,307	2,751	2,016	2,027	1,516	1,780	1,918	1,827	1,975	2,378	2,341	2,824	2,832	2,704	2,383	33,954	2,199	2,199	2,199	2,199
Lower Gunnison O&M	0	0	401	319	320	331	179	0	0	0	0	0	0	0	0	0	0	0	1,550	0	0	0	0
McElmo Creek (Dolores) O&M	0	0	405	340	350	313	247	366	343	445	527	293	392	421	485	345	372	396	6,040	372	372	372	372
USBR Basinwide Program	500	3,464	7,600	12,541	12,044	10,791	11,498	8,548	9,547	8,270	8,474	8,948	7,984	17,281	7,604	8,053	7,884	8,695	159,726	5,783	8,000	8,000	8,000
Subtotal (USBR Program)	500	3,464	12,306	15,651	16,637	14,136	14,944	11,315	12,409	11,301	11,953	12,223	11,630	21,363	12,015	12,647	11,932	12,909	219,335	9,771	11,988	11,988	11,988
USDA Program	0	3,100	2,894	4,016	3,805	5,785	10,451	12,714	19,488	19,798	19,661	19,667	17,611	18,551	14,697	17,651	16,040	15,000	220,929	17,000	17,000	16,000	16,000
Total	500	6,564	15,200	19,667	20,442	19,921	25,395	24,029	31,897	31,099	31,614	31,890	29,241	39,914	26,712	30,298	27,972	27,909	1,046,059	26,771	28,988	27,988	27,988

UPPER BASIN FUND COST SHARE PAYMENTS ($1,000)

Unit	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Subtotal	2014	2015	2016	2017
Grand Valley O&M	0	0	184	33	91	0	45	20	33	32	55	50	44	68	71	71	49	72	917	71	71	71	71
Paradox Valley O&M	0	0	0	109	208	0	99	49	102	101	88	104	134	115	139	142	135	119	1,644	110	110	110	110
Lower Gunnison O&M	0	0	0	20	42	0	21	0	0	0	0	0	0	0	0	0	0	0	83	0	0	0	0
McElmo Creek (Dolores) O&M	0	0	0	20	26	0	21	5	20	22	22	25	25	20	39	22	24	25	317	24	24	24	24
USBR Basinwide Program	0	446	489	739	1,540	0	658	314	531	531	615	1,676	513	1,052	489	518	507	559	11,176	372	514	514	514
Subtotal (USBR Program)	0	446	673	921	1,907	0	844	388	686	686	780	1,855	716	1,255	738	752	715	775	14,137	576	719	719	719
USDA Projects	0	199	189	296	682	0	386	572	1,274	1,256	1,286	1,286	1,132	1,145	945	1,135	1,031	964	13,778	1,093	1,093	1,029	1,029
Total Payment	0	645	862	1,217	2,589	0	1,230	960	1,960	1,942	2,066	3,141	1,848	2,400	1,683	1,887	1,746	1,740	27,915	1,669	1,812	1,748	1,748

LOWER BASIN FUND COST SHARE PAYMENTS ($1,000)

Unit	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Subtotal	2014	2015	2016	2017
Grand Valley O&M	0	0	1,046	186	446	0	255	223	189	0	311	283	308	373	401	401	275	407	5,104	401	401	401	401
Paradox Valley O&M	0	0	0	616	1,210	0	559	558	579	0	500	589	700	663	707	802	766	675	8,925	623	623	623	623
Lower Gunnison O&M	0	0	0	116	237	0	121	0	0	0	0	0	0	0	0	0	0	0	474	0	0	0	0
McElmo Creek (Dolores) O&M	0	0	0	111	147	0	117	62	111	0	122	141	159	154	223	126	136	144	1,752	136	136	136	136
USBR Basinwide Program	0	2,423	2,769	3,503	7,875	1,100	3,729	3,565	3,012	1,954	3,451	3,246	2,904	6,758	2,770	2,934	2,872	3,167	58,032	2,107	2,914	2,914	2,914
Subtotal (USBR Program)	0	2,423	3,815	4,532	9,915	1,100	4,781	4,408	3,891	1,954	4,384	4,269	4,071	7,948	4,101	4,263	4,049	4,393	74,288	3,267	4,074	4,074	4,074
USDA Projects	0	1,129	1,072	1,683	3,868	0	2,185	6,477	7,213	4,627	8,015	7,285	6,265	6,253	5,354	6,430	5,843	5,464	79,163	6,193	6,193	5,829	5,829
Total	0	3,552	4,887	6,215	13,783	1,100	6,966	10,885	11,104	6,581	12,399	11,544	10,336	14,201	9,455	10,693	9,892	9,858	153,451	9,460	10,267	9,903	9,903

LOWER COLORADO RIVER BASIN DEVELOPMENT FUND (LCRBDF)
SURCHARGE FUND STATUS (2 1/2 MILLS)

as of 9/30/13

	YEAR	A COLLECTIONS 1/	B COLLECTIONS 4/	C DEFICIENCY PAYMENTS 2/	D SALINITY TRANSFERS TO TREASURY 2/	E SALINITY PAYMENTS UC REGION 2/	(A + B - C - D - E) F CUMULATIVE BALANCE IN LCRBDF V42 FUNDS
	1987	1,540,704.99		0.00	0.00		1,540,704.99
	1988	9,359,325.00		1,532,868.00	56,609.00		9,310,552.99
	1989	8,442,385.00		1,532,868.00	671,012.00		15,549,057.99
	1990	8,899,347.50		1,532,868.00	967,576.00		21,947,961.49
	1991	8,055,137.50		11,532,868.00	2,424,156.00		16,046,074.99
	1992	7,622,747.50		1,532,868.00	3,341,252.00		18,794,702.49
	1993	6,960,422.50		1,532,868.00	5,502,160.00		18,720,096.99
	1994	8,830,220.00		1,532,868.00	7,853,582.00		18,163,866.99
	1995	8,212,818.42		1,532,868.00	5,833,699.00		19,010,118.41
	1996	9,644,684.16		1,532,868.00	4,575,630.00		22,546,304.57
	1997	9,172,878.54		1,532,868.00	1,370,282.00	3,552,000.00	25,264,033.11
	1998	10,398,523.94		1,532,868.00	2,279,925.00	4,887,000.00	26,962,764.05
	1999	10,908,408.29		730,073.25	1,180,267.00	6,215,000.00	29,745,832.09
	2000	10,410,325.45		0.00	1,034,975.00	13,783,000.00	25,338,182.54
3/	2001	10,255,846.46		0.00	1,034,975.00	1,100,000.00	33,459,054.00
	2002	8,674,271.24		0.00	1,029,973.00	6,966,000.00	34,137,352.24
	2003	8,202,776.78		0.00	1,032,474.00	10,885,000.00	30,422,655.02
	2004	8,307,425.37		0.00	1,032,474.00	11,104,000.00	26,593,606.39
	2005	6,700,765.00	448,360.43	0.00	1,032,474.00	6,581,000.00	26,129,257.82
	2006	8,174,032.50	1,462,304.76	0.00	4,901,904.00	12,399,000.00	18,464,691.08
	2007	8,008,372.50	1,418,251.90	0.00	779,905.00	11,544,000.00	15,567,410.48
	2008	7,842,785.00	1,478,286.68	0.00	419,593.00	10,336,000.00	14,132,889.16
5/	2009	7,574,720.00	1,547,287.68	0.00	997,172.00	0.00	22,257,724.84
6/	2010	7,201,522.50	1,519,804.85	0.00	997,172.00	5,475,213.00	24,506,667.19
	2011	7,846,225.00	1,593,620.74	0.00	997,172.00	14,237,779.00	18,711,561.93
	2012	8,154,242.50	1,552,975.78	0.00	997,172.00	13,015,306.00	14,406,302.21
	2013	7,657,120.00	1,562,447.26	0.00	997,172.00	12,461,662.00	10,167,035.47
	TOTALS	223,058,033.64	12,583,340.08	27,591,621.25	53,340,757.00	144,541,960.00	547,729,426.05

1/ Amounts collected into Colorado River Dam Fund and Transferred to LCRBDF

2/ Payments from LCRBDF

3/ Salinity payment for 2001 was estimated. A trueup was received in 2002 which was $2,501.00 less than was actually paid. Adjusted from 2002 estimate.

4/ Amounts collected into Parker Davis and Transferred to LCRBDF

5/ UC did not request any funds for cost-sharing due to existing & sufficient unliquidated obligations in place

6/ Includes prior year adj of $615.00

COLORADO RIVER BASIN SALINITY CONTROL PROGRAM TITLE II

Upper Colorado River Basin Fund

As of 9/30/2013

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
	Repayment																		
	Paradox Valley Unit			Grand Valley Construction Completed								Las Vegas	Lower Gunnison		McElmo Creek (Dolores Project)		USDA	**Total Transfer to**	
Fiscal Year	Well	Facilities	O&M	Sep-89	Sep-92	Sep-93	Sep-97	Sep-98	Sep-99	Total	O&M	Wash	Construction	O&M	Construction	O&M	NRCS	**Treasury**	Year
1987											2,013						4,905	6,918	1987
1988			973								2,545						86,570	90,088	1988
1989			4,454								914						105,163	110,531	1989
1990			7,190								3,575						146,071	156,936	1990
1991			9,659								4,317					2,269	183,802	200,047	1991
1992			17,701								4,418			10,301		2,321	266,734	301,475	1992
1993			16,011								11,012			11,000		5,230	408,072	451,325	1993
1994			18,457								2,152			15,865		1,917	319,296	357,687	1994
1995			29,749								14,647		1,405,078	16,021		8,845	460,114	1,934,454	1995
1996			90,326								24,860		-7,680	18,525	2,464,892	13,657	145,568	2,750,148	1996
1997			80,337								22,645		675	18,774	21,829	12,613	128,770	285,643	1997
1998			70,676								18,704		-43	19,188	10,658	16,483		135,666	1998
1999													59,331		28,273			87,604	1999
2000																		0	2000
2001																		0	2001
2002																		0	2002
2003																		0	2003
2004																		0	2004
2005																		0	2005
2006																		0	2006
2007																		0	2007
2008																		0	2008
2009																		0	2009
2010																		0	2010
2011																		0	2011
2012																		0	2012
2013																		0	2013
Subtotal	0	0	345,533	0	0	0	0	0	0	0	111,902	0	1,457,361	109,674	2,525,652	63,335	2,255,065	6,868,522	
2014	0	0		0	0	0	0	0	0	0								0	2014
2015	0	0		0	0	0	0	0	0	0								0	2015
2016	0	0		0	0	0	0	0	0	0								0	2016
2017	0	0		0	0	0	0	0	0	0								0	2017
2018	0	0		0	0	0	0	0	0	0								0	2018
2019	0	0		0	0	0	0	0	0	0								0	2019
2020	0	0		0	0	0	0	0	0	0								0	2020
2021	0	0		0	0	0	0	0	0	0								0	2021
2022	0	0		0	0	0	0	0	0	0								0	2022
2023	0	0		0	0	0	0	0	0	0								0	2023
2024	0	0		0	0	0	0	0	0	0								0	2024
2025	0	0		0	0	0	0	0	0	0								0	2025
2026	1,402,063	0		0	0	0	0	0	0	0			-421		-17,328			1,384,314	2026
2027		0		0	0	0	0	0	0	0								0	2027
2028		0		0	0	0	0	0	0	0								0	2028
2029		0		0	0	0	0	0	0	0								0	2029
2030		0		0	0	0	0	0	0	0								0	2030
2031		0		0	0	0	0	0	0	0								0	2031
2032		0		0	0	0	0	0	0	0								0	2032
2033		0		0	0	0	0	0	0	0								0	2033
2034		0		0	0	0	0	0	0	0								0	2034
2035		0		0	0	0	0	0	0	0								0	2035
2036		0		0	0	0	0	0	0	0								0	2036
2037		0		0	0	0	0	0	0	0								0	2037
2038		0		0	0	0	0	0	0	0								0	2038
2039		0		3,200,008	0	0	0	0	0	3,200,008								3,200,008	2039
2040		0			0	0	0	0	0	0		64,747						64,747	2040
2041		0			0	0	0	0	0	0								0	2041
2042		0			347,605	0	0	0	0	347,605								347,605	2042
2043		0				158,454	0	0	0	158,454								158,454	2043
2044		0					0	0	0	0								0	2044
2045		0					0	0	0	0								0	2045
2046		1,071,189					0	0	0	0								1,071,189	2046
2047							209,719	1,059,717	650,148	1,919,584								1,919,584	2047
2048										0									2048
Total	1,402,063	1,071,189	345,533	3,200,008	347,605	158,454	209,719	1,059,717	650,148	5,625,651	111,902	64,747	1,456,940	109,674	2,508,324	63,335	2,255,065	15,014,423	